Giant wall chart of electronic diagrams & symbols included free…

CALECTRO HANDBOOK

PRICE 50¢

A valuable guide for the electronic hobbyist & experimenter

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- Filled with practical do-it-yourself information, charts, formulas, tables
- How to select what you need in electronics

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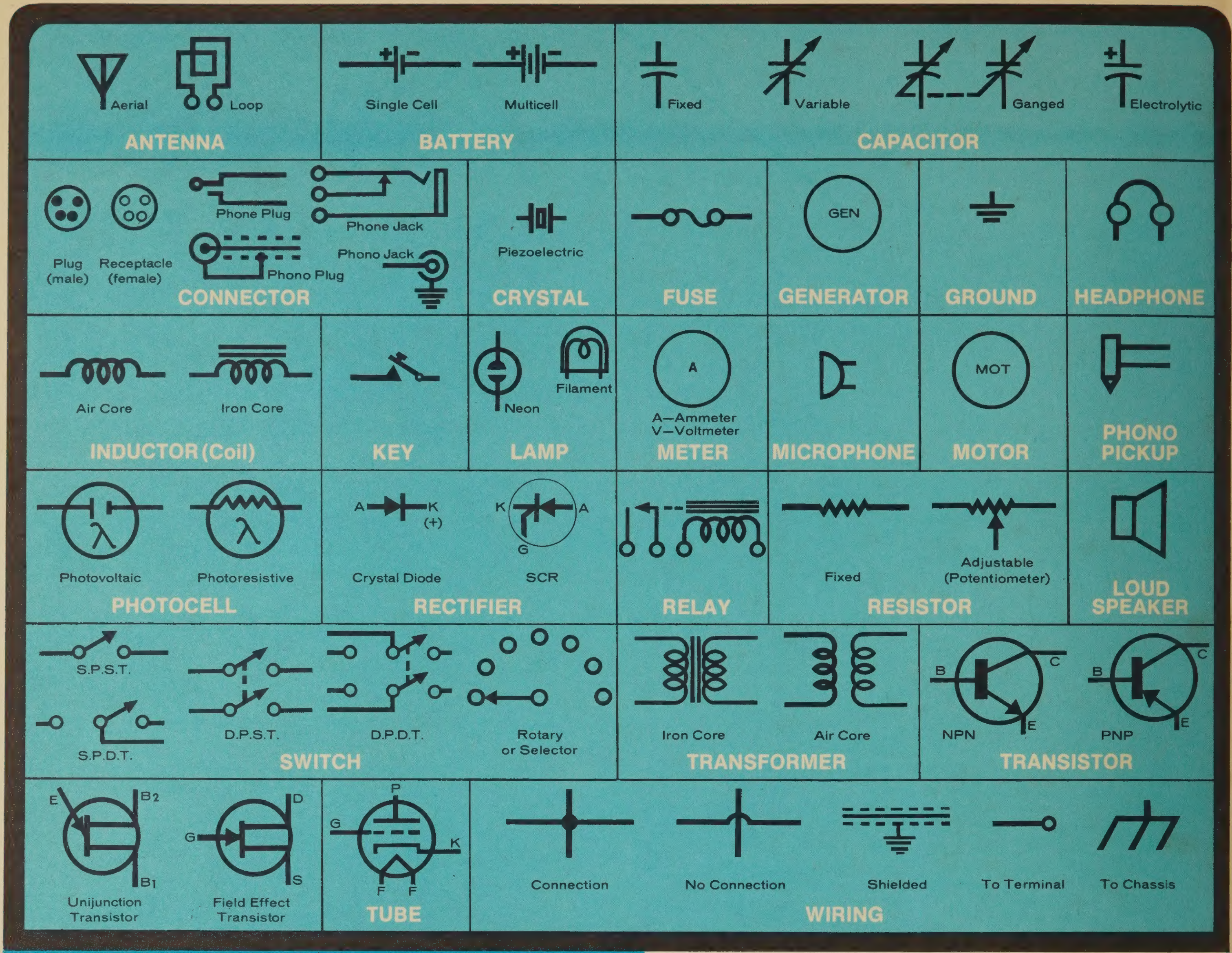

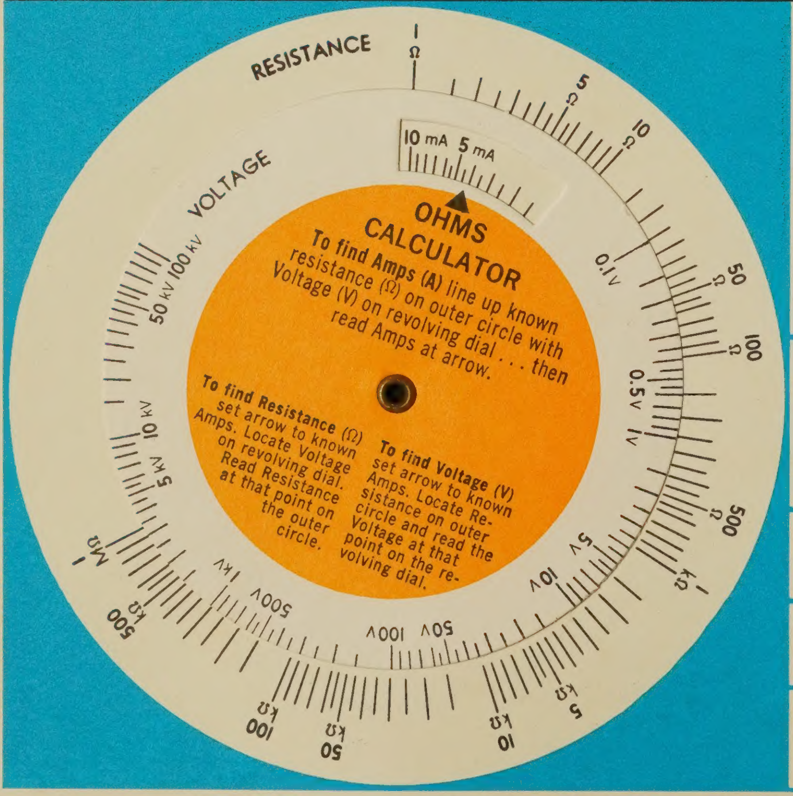

OHMS CALCULATOR

To find Amps (A) line up known resistance (Ω) on outer circle with Voltage (V) on revolving dial . . . then read Amps at arrow.

To find Resistance (Ω) set arrow to known Amps. Locate Voltage on revolving dial. Read Resistance at that point on the outer circle.

To find Voltage (V) set arrow to known Amps. Locate Resistance on outer circle and read the Voltage at that point on the revolving dial.

OHMS LAW EQUATIONS

(For DC Current)

E = Voltage in Volts
I = Current in Amperes
P = Power in Watts
R = Resistance in Ohms

Unknown Value	Formulas		
E	$E = IR$	$E = \frac{P}{I}$	$E = \sqrt{PR}$
I	$I = \frac{E}{R}$	$I = \frac{P}{E}$	$I = \sqrt{\frac{P}{R}}$
P	$P = EI$	$P = \frac{E^2}{R}$	$P = I^2R$
R	$R = \frac{E}{I}$	$R = \frac{E^2}{P}$	$R = \frac{P}{I^2}$

FORM NO. FR-69-C

CALECTRO HANDBOOK

A valuable guide for the electronic hobbyist & experimenter

A WORD ABOUT CALECTRO We have devoted a good deal of effort to making this Handbook both interesting and informative, regardless of your own level of involvement in this fascinating field of electronics. Whether you are a beginning hobbyist, advanced student, a do-it-yourselfer, even an engineer or technician, you will find this book a useful source of information and a valuable reference well worth keeping handy.

Our Calectro products are yours via self-service — the convenient, time-saving way to shop. They're displayed so you can find what you want quickly and easily. Each item comes with all the technical information you need to select and use it properly.

We welcome your comments on both this Handbook and on our product line. With your help, we hope to continually improve our service to you.

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ELECTRONICS
GC ELECTRONICS DIVISION OF HYDROMETALS, INC.

400 SOUTH WYMAN STREET ROCKFORD, ILLINOIS 61101 • USA • PHONE 968-9661, AREA CODE 815

MICROPHONES — HOW TO CHOOSE AND USE 'EM!

Your mike is the first step in the process of storing, amplifying or transmitting sound electronically. And it's usually the weakest link in most "packaged" non-professional systems, whether tape recorder, public address, paging, or even broadcasting system.

So, upgrading your microphone is usually a quick way to improve the overall quality of your system—provided you choose the right type and use it properly. Of the many types available, the most used are Dynamic (or Moving Coil) and Crystal or Ceramic mikes. Other types—Ribbon, Condenser, etc.—are usually too delicate or expensive for use in non-professional systems.

CRYSTAL AND CERAMIC mikes vibrate a crystal or ceramic element to produce a small, high impedance signal. They can be capable of quite satisfactory performance, considering their usually low cost, but are sensitive to shock, vibration, and sometimes humidity.

DYNAMIC microphones convert sound to a high and/or low impedance signal with a moving coil in a magnetic field. Rugged and reliable, they resist extremes of temperature and humidity and are available in a variety of styles at a wide range of prices.

OMNIDIRECTIONAL OR UNIDIRECTIONAL? Omnidirectional mikes pick up sound from all directions. Unidirectional mikes pick up sound from one direction, primarily, reducing sounds from the sides and rear to much lower levels, and thereby eliminating noise. Their pickup pattern (shown below) is frequently heart-shaped, accounting for the fact that these mikes are often called Cardioids.

Either type—omnidirectional or unidirectional—works well when recording individual voices or small groups under good acoustical conditions. An omnidirectional mike is the obvious choice for roundtable discussions, as well as for recording bands and choirs, etc. For use in large halls, auditoriums, and churches—where echo, noise and/or feedback may be problems—you're usually better off with a unidirectional mike.

FREQUENCY RESPONSE measures the range of sounds, from low to high pitched, from which a mike produces a usable signal. A mike with 300-4000 Hz frequency response, for example, is fine for intercoms, paging systems, etc. But, for quality music reproduction, you'd want something more like 50-15,000 Hz.

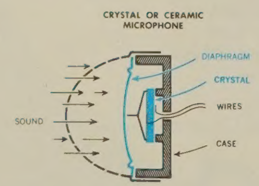
OUTPUT LEVEL, or sensitivity, measures a mike's efficiency in converting sounds into electrical signal. The lower the number used to express a mike's rated output, the higher its sensitivity. So, a mike with —55 db rated output is more sensitive and has a higher output than one rated at —60 db. Most amplifiers and tape recorders will handle mikes with sensitivity down to about —70 db or even less.

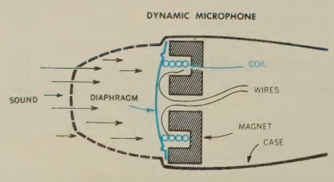
IMPEDANCE of your microphone—high or low—should match the input impedance of whatever equipment you're using it with. The distance from mike to amplifier or recorder is a factor, too. Popular high impedance mikes are fine up to about 20 feet, but a longer cable may create hum and affect frequency response. At from 20 to 100 feet use a low impedance mike, with matching transformer at the equipment if necessary.

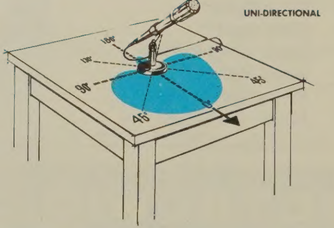
SO, HOW DO YOU CHOOSE? Weigh the factors we've discussed against how much you have to spend, remembering that specifications don't tell the whole story. Two mikes may claim identical frequency response and output levels, yet one may be priced two or three times higher than the other. The better one most likely delivers flatter response (with fewer peaks and valleys), less distortion and noise, and generally cleaner sound. Don't be deceived by looks either, since many low-priced mikes are a lot better on styling than on quality inside. You usually get pretty much what you pay for.

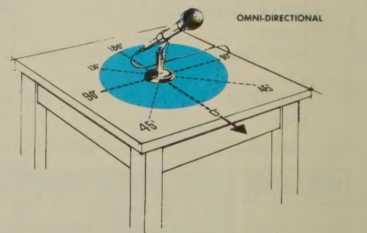
NOW, HOW DO YOU USE? Practice makes perfect, when it comes to mike placement and technique. There are just too many variables to cover here. But these few tips will help.

1. Placing your mike close to the source of the sound helps reduce background noise to a minimum.
2. But, don't speak or sing into a mike too close! your result may get too "breathy" or full of "P-pops."
3. Don't shout into your mike. Let the amplifier do the work. Even when you raise your voice for emphasis, back away a bit.
4. Don't rub or tap the mike, as it might amplify louder than you think. And the same goes for shuffling papers and tapping on the rostrum or table.


CRYSTAL OR CERAMIC MICROPHONE


DYNAMIC MICROPHONE


UNI-DIRECTIONAL


OMNI-DIRECTIONAL

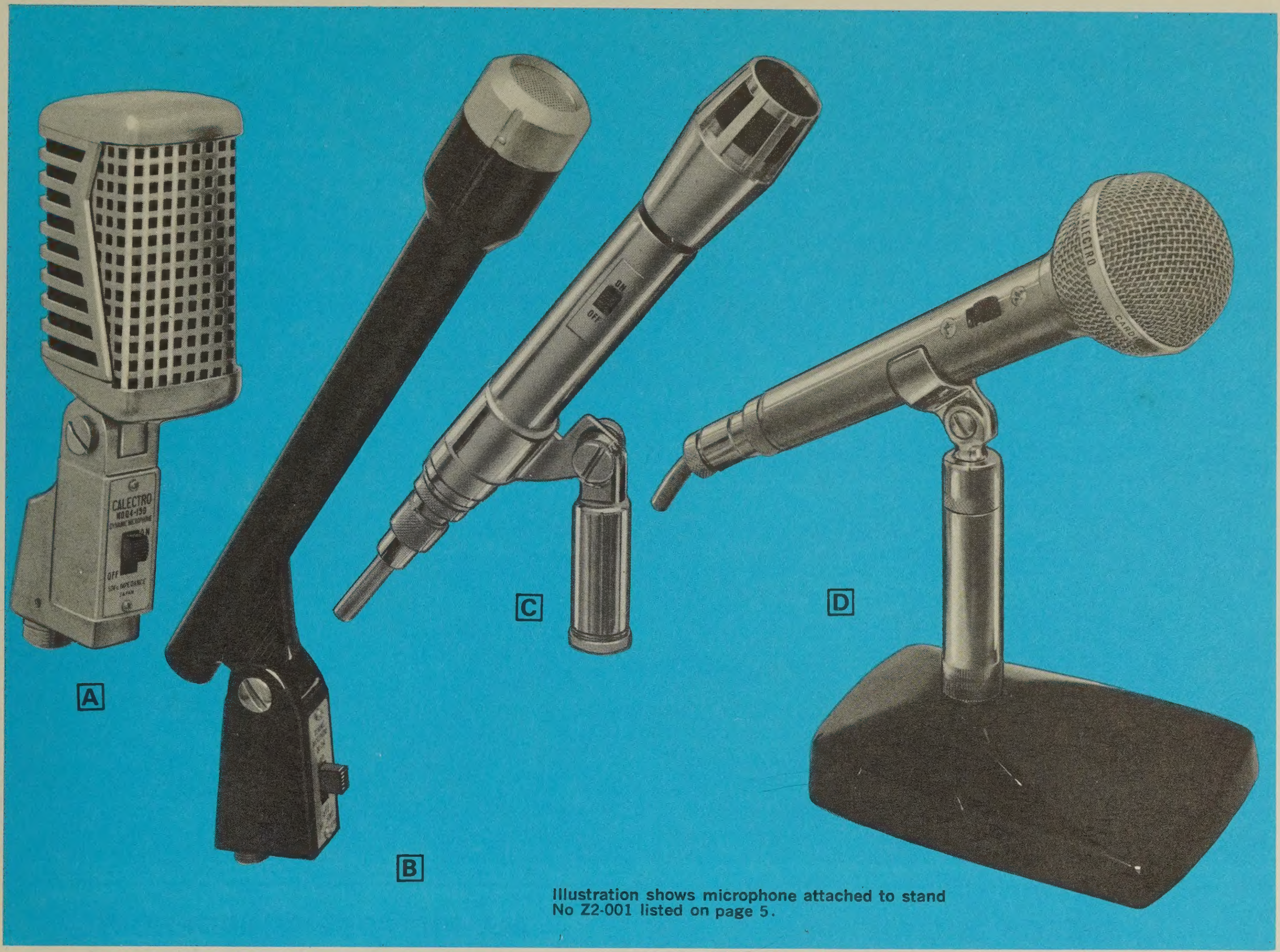


Illustration shows microphone attached to stand No Z2-001 listed on page 5.

STUDIO QUALITY MICROPHONE

Dynamic, Semi-Directional

A Excellent tone quality, for voice and music uses on stage, recording, broadcasting, public address systems, etc. Beautifully styled satin chrome housing of die cast metal. Built-in on/off switch. Swivel mount. 20 foot cable with connector included.

SPECIFICATIONS

Frequency Response: 80 to 12k Hz.
Output: -58 dB Impedance: 50k ohm

Cat. No. Q4-150 **$17.95 Net**

BROADCAST QUALITY MICROPHONE

Dynamic, Omni-Directional

B For highest fidelity recording of voice or music. Unequaled at virtually any price! Omni-directional for perfect pickup of groups, bands, audience, etc. Gives real "presence" to tape recording. Exquisitely styled black finish wtih satin gold trim. Cast metal housing with swivel. On/off switch built into mike stand connector. 20 foot cable with connector included.

SPECIFICATIONS

Frequency Response: 50-14k Hz (virtually FLAT from 100 to 8k Hz).
Output: -56 dB Impedance: 50k ohm

Cat. No. Q4-154 **$18.95 Net**

PROFESSIONAL ENTERTAINER & SPEAKER MICROPHONES

RECORDING, BROADCAST AND P.A. MICROPHONES for soloists, announcers, entertainers and public speakers. Wide, flat frequency response puts these mikes in the truly professional class. Built-in "pop" and wind noise barriers. Special swivel holder permits easy shift from stand to stand. Built-in on/off switch.

C OMNI-DIRECTIONAL DYNAMIC TYPE

Exceptional "life like" sound reproduction. Light, slim, and finished in beautiful satin silver.

SPECIFICATIONS:

Frequency Response: 55-13,000 Hz
Impedance: Dual-200/50K ohm
Output: Low imped.: -85 dB; High imped.: -62 dB
Accessories: Swivel holder and 15 ft. cable.

Cat. No. Q4-157 **$19.95 Net**

D CARDIOD TYPE, DYNAMIC

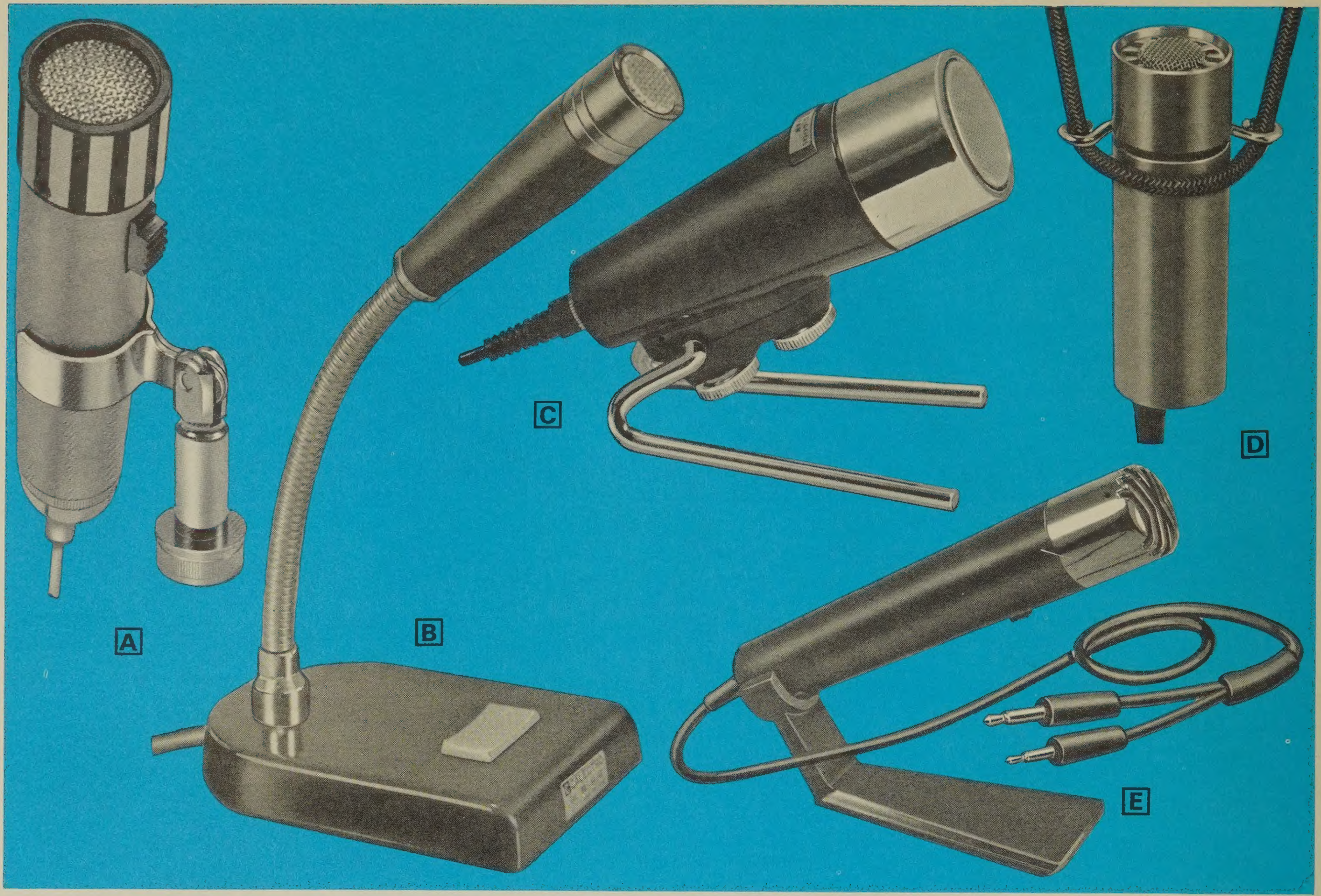
Minimizes pickup from back and sides. Reduces feedback problems and extraneous noise. One of the finest cardiod type microphones at any price.

SPECIFICATIONS:

Frequency Response: 50 to 13k Hz.
Output: -58 dB
Impedance: 50k ohm
Accessories: 10 foot cord with connector, lavalier strap

Cat. No. Q4-152 **$22.50 Net**

NOTE TO STEREO RECORDERS: **Uniform performance characteristics of these microphones make them ideally suited for use in pairs for stereo recordings.**



SPEECH MICROPHONE

Crystal Type, High Impedance

A Here is an inexpensive "all purpose" mike—complete with three attachments: (1) Desk Stand (not shown in picture); (2) Floor stand adaptor with swivel adjustment; (3) Lavalier cord with holder. Excellent for all speech uses from P.A. systems to tape recording. Brushed satin finish metal housing. 4½ foot cord with miniature phone plug. Features built-in on/off push switch that locks in place when desired.

SPECIFICATIONS

Frequency Response: 60-9k Hz.
Output: -65 dB.

Cat. No. Q4-147 **$5.95 Net**

COMMUNICATION MICROPHONE

Dynamic, High Impedance

B Developed for use by "hams", citizen band base station, and general paging needs. Features desk stand with rocker type on/off switch. Flexible 6" gooseneck. Excellent acoustical qualities especially for voice.

SPECIFICATIONS

Frequency Response: 100 to 8k Hz.
Output: -58 dB.
Impedance: 50k ohm.
Accessories: 4½ foot cord with min. phone plug.

Cat. No. Q4-148 **$9.90 Net**

ALL PURPOSE MICROPHONE

Cardioid Dynamic - Hi Fidelity

C Compact in size—outstanding in performance for recording, announcing, paging, P.A., etc. Cardioid directional sound pattern minimizes sounds coming in from back and sides. Adjustable desk stand.

SPECIFICATIONS

Frequency Response: 50 to 12k Hz.
Output: -50 dB. Impedance: 50k ohm.
Accessories: 6 foot cord with miniature phone plug.

Cat. No. Q4-145 **$12.00 Net**

LAVALIER MICROPHONE

Dynamic, Hi Fidelity

D Lightweight, compact, rugged construction. Perfect for public speakers, interviews, sales demonstrations, etc. A professional instrument with excellent frequency response assuring life-like speech and music reproduction. Use as hand held mike or with neck strap (supplied).

SPECIFICATIONS

Frequency Response: 100 to 15k Hz.
Output: -59 dB. Impedance: 50k ohm.
Accessories: 3 foot cord with miniature phone plug.

Cat. No. Q4-142 **$7.95 Net**

TAPE RECORDER MICROPHONE

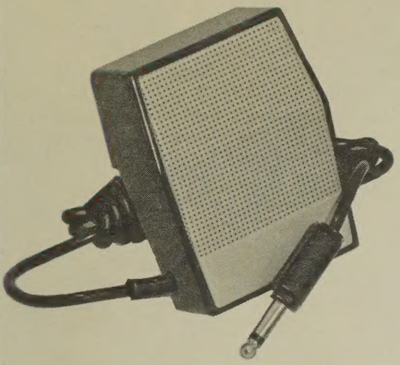
Dynamic, Low Impedance, Remote Control

E Outstanding performance on music and speech considering the price. For the recording enthusiast who wishes to improve the quality of his low or medium priced tape recorder. Low impedance matches late models (solid state) recorders. Removable desk stand; 4½ foot cord has dual plugs that fit most makes and models.

SPECIFICATIONS

Frequency Response: 100-8k Hz.
Output: -77 dB. Impedance: 200 ohm.

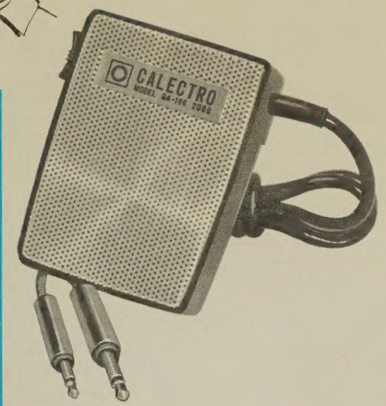
Cat. No. Q4-146 **$4.95 Net**



MINIATURE DYNAMIC MICROPHONE

Versatile, High Fidelity, Omni-Directional modern mike for tape recorders, communications, paging, etc. Impedance: 50k ohm; Output: -56dB; Frequency Response: 100-8000k Hz. 4 ft. cord with miniature phone plug.

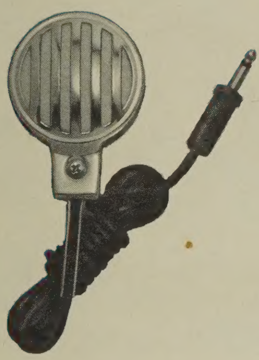
Cat. No. Q4-184
$4.95 Net



TAPE RECORDER REPLACEMENT MICROPHONE

For use with late model (low impedance - solid state) recorders. Remote control switch in mike stops and starts recorder. Dual plugs fit most makes and models. Folding desk stand. Frequency Response: 80 to 8000k Hz; Output: -56dB; Impedance: 200 ohm.

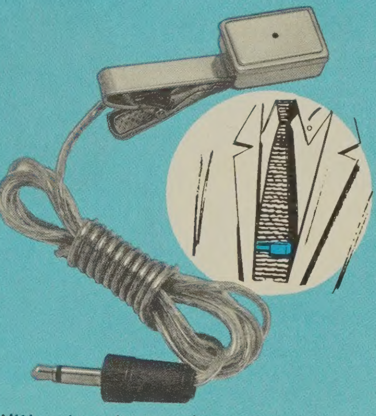
Cat. No. Q4-186
$3.95 Net



LAPEL MICROPHONE

Popular all purpose high impedance crystal mike for hobbyist, experimenter, student. 1½" diameter—gold finish—miniature phone plug. Impedance: 85k ohm; Output: -65dB.

Cat. No. Q4-189
$1.25 Net

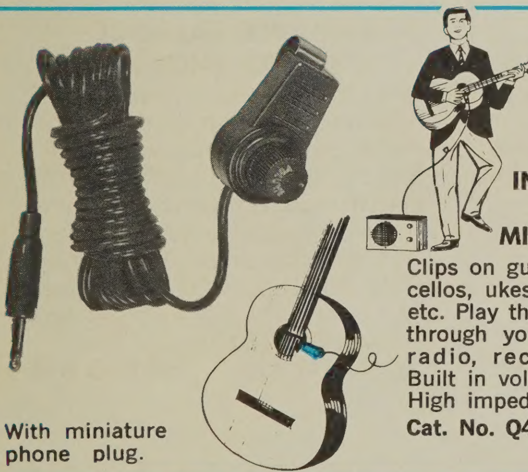


With min. phone plug.

TIE CLASP MICROPHONE

Tiny "secret" magnetic microphone to record, transmit, or amplify voice without being obvious. Impedance: 1600 ohm; Output: -70dB; Frequency Response: 300-4000k Hz.

Cat. No. Q4-191
$3.95 Net

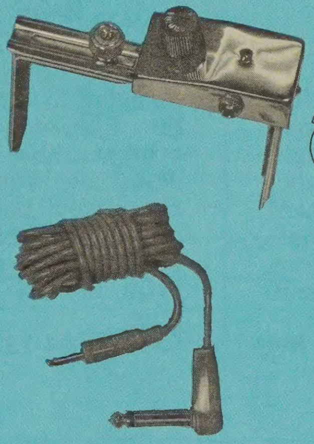


With miniature phone plug.

MUSICAL INSTRUMENT CONTACT MICROPHONE

Clips on guitars, violins, cellos, ukes, mandolins, etc. Play the instrument through your amplifier, radio, recorder, etc. Built in volume control. High impedance.

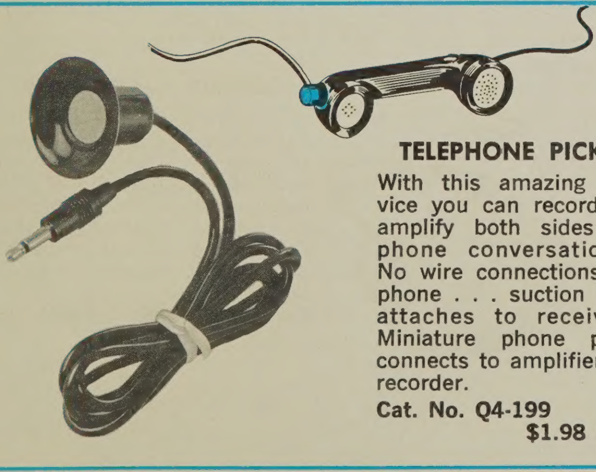
Cat. No. Q4-194
$3.25 Net



GUITAR MICROPHONE

Now you can convert guitars, banjos, mandolins, ukes, etc., into electrical instruments for amplified sound. Excellent response and sensitivity. High impedance. Clamps on without tools. Built in volume control. Connects to amplifiers, recorders, etc.

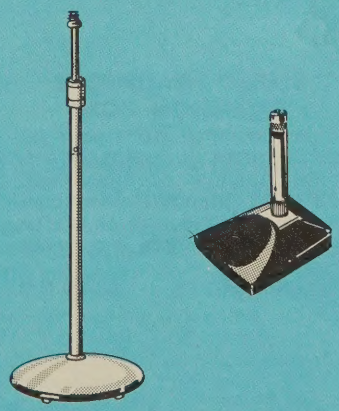
Q4-196 **$5.65 Net**



TELEPHONE PICKUP

With this amazing device you can record or amplify both sides of phone conversations. No wire connections to phone . . . suction cup attaches to receiver. Miniature phone plug connects to amplifier or recorder.

Cat. No. Q4-199
$1.98 Net



MICROPHONE STANDS

Modern style desk stand fits all mikes. Non-tip cast base, black finish, chrome 3" shaft, ⅝" x 27 thread.

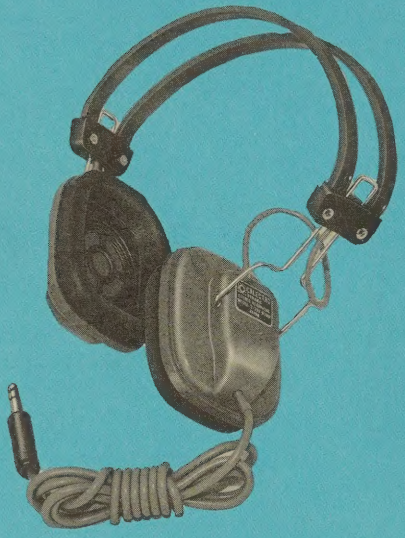
Cat. No. Z2-001
$3.95 Net

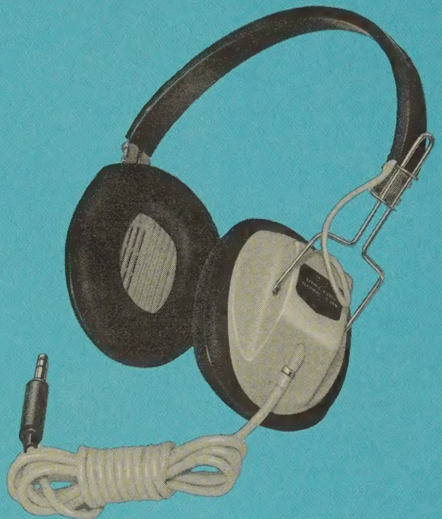
Self-leveling floor stand with telescoping 2-piece chrome tubing. Adjusts from 34" to 62". ⅝" x 27 thread fits all mikes.

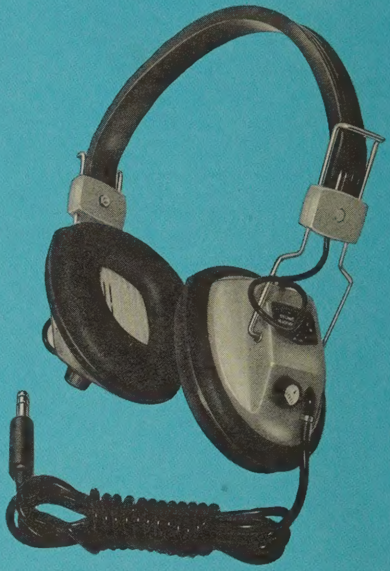
Cat. No. Z2-010
$8.95 Net

A NEW EXPERIENCE IN STEREO LISTENING!

If you've never heard your favorite stereo tapes, records, and broadcasts on headphones, you just don't know what you've been missing. Because they're the only way to really separate stereo into two distinct channels — one for each of your ears. It's just not possible with loudspeakers. So, slip on a pair of top-quality phones, close your eyes, and instantly you're in front row center — hearing every shade and nuance of the performance just as it was intended to be heard. And, now you're free to sit anywhere you like. There's no more need to sit midway between your speakers. No distractions, either, since headphones keep out noises — like the TV your family may be watching. Yet you won't disturb them, either — no matter how loud you choose to play your music!







STEREO HEADPHONE

Budget priced — but what remarkable performance. And it's really comfortable, with dual headband, soft rubber cushions, and adjustable earpieces. Weighs only 10 oz. and has a frequency range from 20 to 15,000 cycles. Connects to all standard amplifier outputs from 4 to 16 ohm. Cord is 5 ft. long with stereo plug.

Cat. No. Q4-130 $9.95 Net

HIGH FIDELITY STEREO PHONE

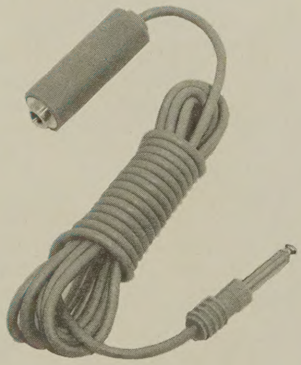
Superb performance — like listening to a $500 speaker system. Extremely comfortable, soft sponge rubber cushions and fully adjustable headbands. Frequency range from below 20 to 20,000 cycles. Connects to amplifier outputs from 4 to 16 ohm. 6½′ extra flexible cord with stereo plug.

Cat. No. Q4-131 $13.75 Net

VARIABLE BALANCE STEREO PHONE

The ultimate in comfort and sound reproduction. Equal to the finest headphones available. Unique "Sound Level" control on each earpiece permits adjustment to your own tonal preference and balance. Frequency range: 20 to above 20,000 cycles. 6½′ cord with stereo plug. Impedance 4 to 16 ohms.

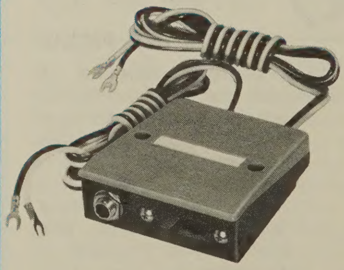
Cat. No. Q4-132 $17.95 Net



STEREO HEADPHONE EXTENSION CORD

Enjoy listening from your favorite chair. Just plug in and have freedom of movement. 20′ long; Standard 3 conductor plug and jack at ends. For greater length use 2 or more cords.

Cat. No. Q4-278 $2.99 Net



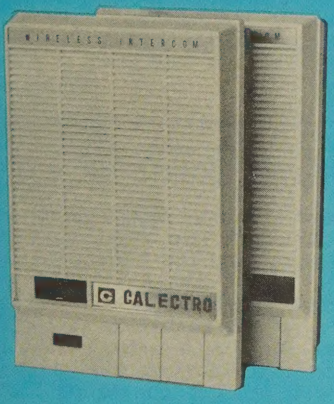
STEREO HEADPHONE JUNCTION BOX

For connecting stereo phones to amplifiers which are not equipped with a phone jack. Easily attached. Built-in circuit to prevent overload. Has switch to select between phone only, speakers only, or both.

Cat. No. Q4-226 $4.95 Net

TWO STATION WIRELESS INTERCOM

Just plug into any electrical outlet and talk. No installation — no wires. Completely portable, it's ideal for use between kitchen, workshop, basement or in offices, warehouses, etc. Attractive "keyboard" push buttons with locking feature for baby monitoring, or dictation. Expand system anytime with additional units.

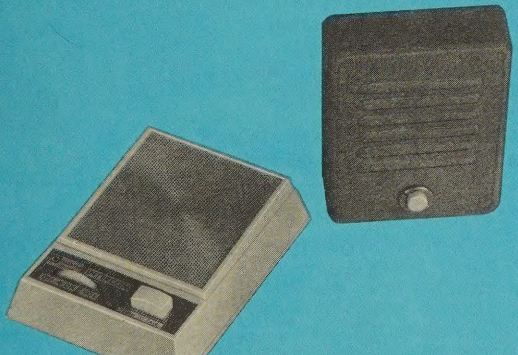


Two unit system complete in display pack:
Cat. No. N4-110
$34.95 Net

JUST PLUG IT IN

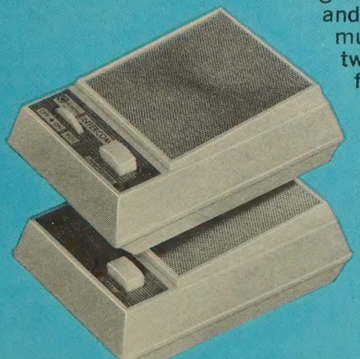
SOLID STATE
DOOR ANSWERING INTERCOM

Identify visitors before opening door. Protects you from strangers at the door. Saves many steps if "master" is installed in kitchen or bedroom. Complete 2-way conversation. Simple to hook up. 65 ft. of cable, pkg. of staples and 9 v. battery are included.
Cat. No. N4-101 **$12.95 Net**



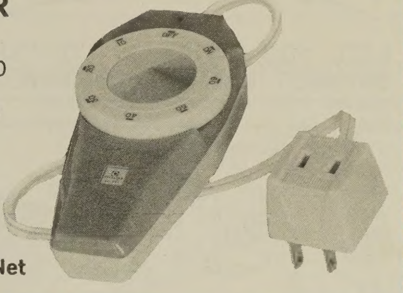
SOLID STATE
TWO STATION INTERCOM

A great time saver in homes and offices. Instant communication between any two locations. Also ideal for "baby sitting" too. Remote station can signal even if switch on master is off. Connects in minutes by plugging cable (65 ft. included) into each unit. Battery included.
N4-100 **$12.95 Net**



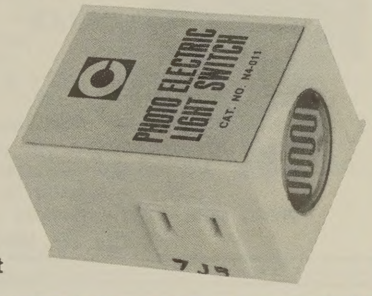
AUTOMATIC TIMER ON-OFF SWITCH

Set for any time — up to 60 minutes — and your radio, TV, hi-fi, lamp, fan, etc., will shut off automatically. Convenient 12 ft. cord permits remote on/off operation. No installation — just plug in. Rated @ 115 V AC - 600 w.max.
Cat. No. N4-005 **$6.95 Net**



DAY 'N NIGHT AUTOMATIC LIGHT SWITCH

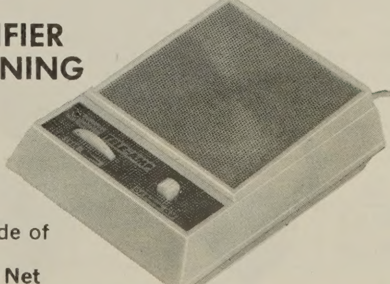
This photo-electric "night watchman" automatically turns on any lamp in your house at night and turns it off at dawn. Your house will look "lived-in" when you are away and you'll feel safer returning to a lighted house. No installation — just plug it in.
Cat. No. N4-011 **$5.95 Net**



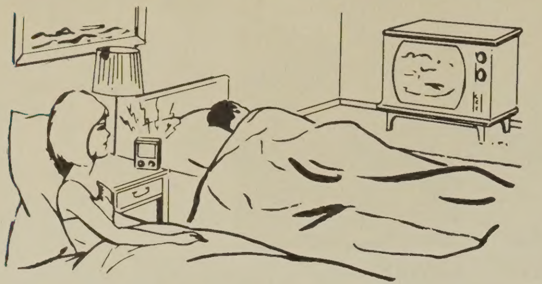
HELLO GRANDMA, WE ARE ALL LISTENING!

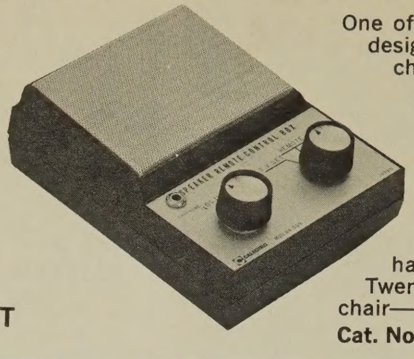
TELEPHONE AMPLIFIER FOR GROUP LISTENING

Ideal for "conference calls" at the office and group listening at home. Leaves your hands free for writing or waiting. No "hook-up"; just attach suction cup pickup to outside of phone. Battery included.
Cat. No. N4-103 **$9.95 Net**



REMOTE CONTROL EXTENSION SPEAKER FOR TV OR RADIO





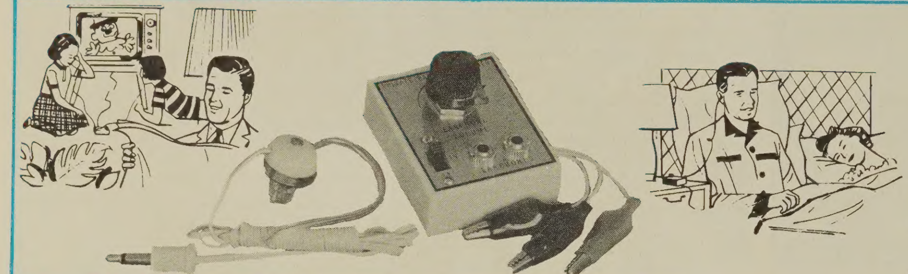
LETS YOU LISTEN IN COMPLETE COMFORT WITHOUT DISTURBING OTHERS.

One of the greatest "convenience items" ever designed. A real blessing for families with children. Combines the advantages of remote volume control with those of an extension speaker.

You can control your volume and you can switch the main speaker on or off by remote control. Allows you to plug in and control an earphone or pillow speaker for complete privacy. A blessing for the hard-of-hearing and invalid.

Twenty foot cable readily reaches your easy chair—your bed—or even your porch or patio.

Cat. No. N4-009 **$6.50 Net**



PRIVATE SOUND FOR SILENT TV VIEWING

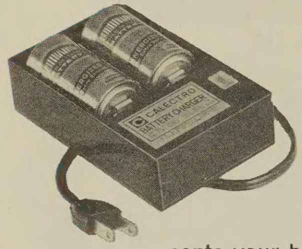
Listen to TV or radio without disturbing others. Ideal for children, "late show" listeners, invalids, and the hard-of-hearing. Attaches to any set.

The small control unit has jacks for 2 earphones & a volume control to adjust the sound volume. Also has a switch to turn off speaker in TV or radio. Complete with one earphone & 15 ft. connecting cable.

Cat. No. N4-014 **$3.95 Net**

SAVE ON BATTERY COST WITH THESE MONEY SAVING ADAPTORS AND CHARGERS

RADIO AND FLASHLIGHT BATTERY CHARGER



Don't discard weak batteries. Prolong their useful life by re-charging them 5 or 10 times. This handy device will accept penlight and regular "C" or "D" flashlight cells (two at a time). It will also charge standard 9 volt transistor radio batteries. Just plug it in your electrical outlet, insert batteries, and for a couple of cents your batteries will be restored overnight. Neon pilot light indicates when charger is operating.

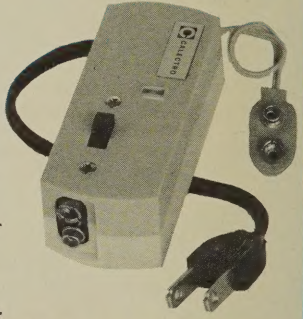
Cat. No. N4-053 **$4.95 Net**

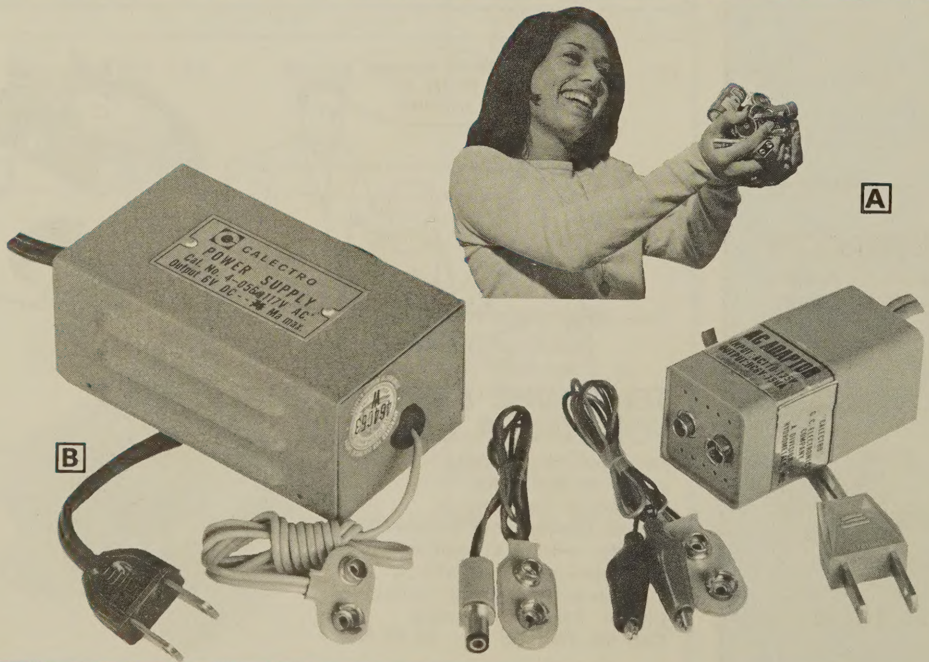
9 VOLT TRANSISTOR RADIO

BATTERY ELIMINATOR AND CHARGER

Converts transistor radios, using standard small 9 Volt batteries, to AC operation. Also recharges weak batteries so you can use them again and again. Besides radios, this eliminator is ideal for use with small intercoms, telephone amplifiers, and any other electronic device using the standard, small 9 Volt battery.

Cat. No. N4-055 **$4.95 Net**





BATTERY SAVING AC ADAPTORS

OPERATE YOUR BATTERY TYPE ELECTRONIC EQUIPMENT FROM YOUR 115 VOLT AC HOUSE CURRENT — AND SAVE YOUR BATTERIES. YOU ALSO HAVE THE ADVANTAGE OF FULL POWER ALL THE TIME, WHEREAS BATTERIES BECOME CONTINUALLY WEAKER WITH USE AND WITH TIME.

A RADIO TYPE ADAPTORS

These small units provide sufficient power to operate portable radios, small walkie talkies, intercoms, phone amplifiers, science projects, etc. To facilitate connecting, these adaptors are equipped with battery snaps, alligator clip adaptor, and standard power supply plug — to fit nearly any set.

Cat. No.	DC Volt	Max. Load	Net
N4-056	6	75 mA	**$4.95**
N4-057	9	50 mA	**$4.95**

B RECORDER TYPE ADAPTORS

Similar to the radio adaptors listed above, but designed to provide sufficient power to operate most tape recorders, battery operated phonographs, dictating machines, small CB equipment, and any other electronic device requiring current within the rating of these units. Supplied with 3 different connectors to fit practically any set.

Cat. No.	DC Volt	Max. Load	Net
N4-061	6	250 mA	**$7.95**
N4-062	9	200 mA	**$7.95**

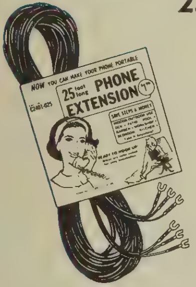
MAKE YOUR PHONE PORTABLE!
TELEPHONE PLUGS, OUTLETS AND EXTENSION CORDS

Use them in any room in the house. Install these devices in minutes, and add great convenience and privacy to your phone conversations.

25 FT. PHONE EXT. CORD

Heavy duty, flexible, snarl resistant cord with standard 4 prong plug and jack securely molded at ends. A great convenience for every household.

N4-026 $2.98 Net



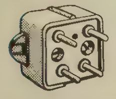
NOW YOU CAN MAKE YOUR PHONE PORTABLE
25 feet long PHONE EXTENSION

25 FT. TELEPHONE CORD

Use this cord where it is impractical to install plugs and jacks. In replacing the regular short cord with this 25 ft. cord, you can take your phone from room to room — to the kitchen, bathroom, backyard, etc. Cord has 3 color coded conductors, with lugs at ends.

Cat. No. N4-025 $1.98 Net

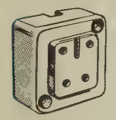
STANDARD 4 PRONG PHONE PLUG



Fits all single and 2-line phones. Easy to attach to cord with screw terminal. No soldering. Ivory color.

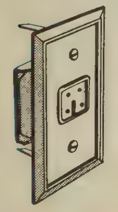
Cat. No. N4-022 $.89 Net

STANDARD 4 PRONG PHONE JACK



This outlet mounts to the wall with 2 woodscrews which are included. Screw type terminals. Ivory color.

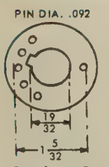
Cat. No. N4-023 $.98 Net



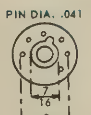
TELEPHONE WALL OUTLET

Same as telephone jack listed above, but mounts in regular electrical outlet box. May also be flush mounted to wall without box, using special brackets supplied.

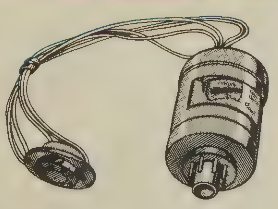
Cat. No. N4-024 $1.75 Net



Socket for 90° Tubes



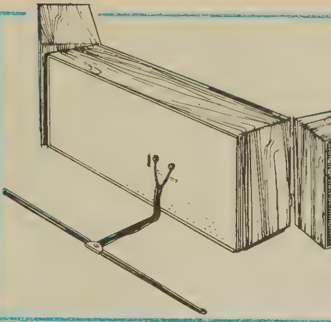
Socket for 110° Tubes



TV PICTURE TUBE BRIGHTENERS
GIVES NEW LIFE TO AGEING PICTURE TUBES

Restores brightness and contrast. Corrects problems caused by low emission or internal shorts. Works in parallel or series circuits. No wiring. Just plugs in.

N4-035	For 110° B & W Tubes	**$2.95 Net**
N4-036	For 90° B & W Tubes	**$2.85 Net**
N4-037	For Round Color Tubes	**$6.95 Net**
N4-038	For Rect. Color Tubes	**$7.75 Net**



"FOLDED DIPOLE" INDOOR FM RADIO ANTENNA

Improve your FM and multiplex-stereo reception. Superior to built-in antenna. Just connect to terminals on your radio and locate antenna behind set, along baseboard, or under carpet. Installs in a few minutes.

Cat. No. N4-013 $1.79 Net

TV AUDIO REMOTE CONTROL

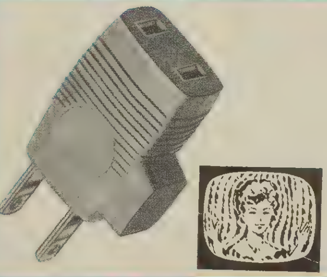
Switch off TV sound from across the room — picture stays on! Tune out commercials — turn off the sound for conversation and phone calls. Easy to hook up. 15 ft. cable included.

Cat. No. N4-015 $1.45 Net

REMOTE SWITCH CORD

Why get up from your easy chair, or get out of bed to turn your TV, radio, hi-fi, or other electrical device on or off? This 15 ft. remote control switch cord just plugs in. Completely safe. U.L. Approved.

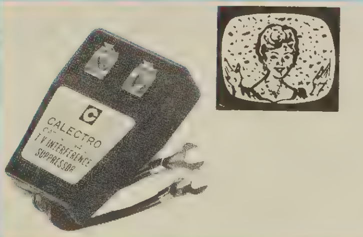
Cat. No. N4-028 $1.98 Net



RADIO-TV NOISE FILTER
POWER LINE FILTER

Reduces or eliminates "static" caused by appliances, office machines, cash registers, razors, lights, heating pads, etc. Just plugs in.

Cat. No. N4-021 $1.19 Net

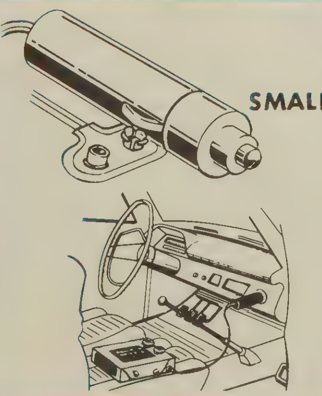


TV INTERFERENCE FILTER
ANTENNA "BAND PASS" FILTER

For the elimination or reduction of interference caused by airplanes, CB and "hams," automobiles, electro-medical equipment, etc. Connects between set and antenna lead-in wire.

Cat. No. N4-019 $1.49 Net

AUTOMOBILE TRANSVERTER
USE YOUR AUTO OR BOAT BATTERY TO POWER YOUR BATTERY RADIO, SMALL CB RADIOS, ETC. SAVES BATTERIES



Just plug this transverter into the cigarette lighter receptacle and connect to your equipment. Zener Diode regulator keeps voltage at proper level.

Adapter with alligator clips included.

Cat. No.	Voltage (DC) Input	Output	Max. Current	Net
N4-032	12-14	6	100 mA	$2.95
N4-033	12-14	9	100 mA	$2.95

COMPACT HI-FI SPEAKER SYSTEM

Truly Hi-Fi performance in an ultra compact, beautifully finished cabinet. Powerful woofer of the "acoustic suspension" type coupled with a rear-loaded mid/high frequency tweeter produces true life-like sound with excellent base, mid-range and clean highs.

Specification:

Impedance 8 ohm; power handling capacity 10 watt; frequency response 40 to 20 K Hz, virtually flat from 90 thru 16 K Hz
Size: 6½" wide, 10¾" high, 6⅞" deep.

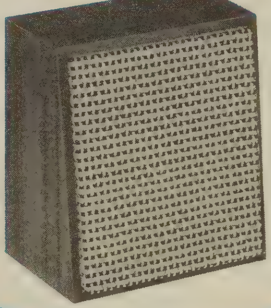
Cat. No. Z2-265 **$16.95 ea. /$32.50 pair**

Sloping Front Panel for Mounting on Wall.

UNIVERSAL EXTENSION SPEAKER

The perfect speaker for extending your music system throughout your home or office, or to connect to your transistor radio for "Big Set" sound. Beautiful hand finished walnut cabinet and matching cane pattern plastic grill. 3" x 6" speaker and good acoustical design assure excellent music and speech reproduction. Surprisingly good stereo sound when used in pairs. Built-in volume control. Screw terminals for wire connections. Brackets for wall mounting. Specification: 8 ohm — 3 watt. Size: 12" wide, 8½" high, 3¾" deep.

Cat. No. Z2-255 **$8.95 Net**

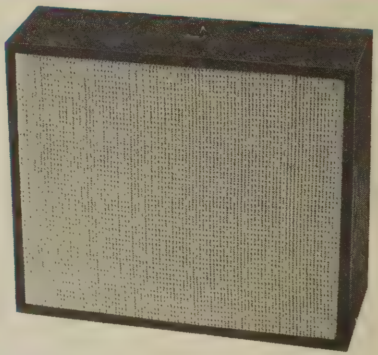


Ideal for Book Shelf or Desk Top Use.

SMALL EXTENSION SPEAKER

A versatile, very small speaker for chair or bedside TV or radio extensions, intercoms, low level paging, etc. Attractive hand-rubbed walnut cabinet contains 4" quality speaker. Fits table, desk or shelf — or may be hung on wall. Closed back. Screw terminals for easy attaching of wire. Specification: 8 ohm — 1 watt
Size: 5" wide, 5½" high, 3½" deep

Cat. No. Z2-254 **$4.95 Net**

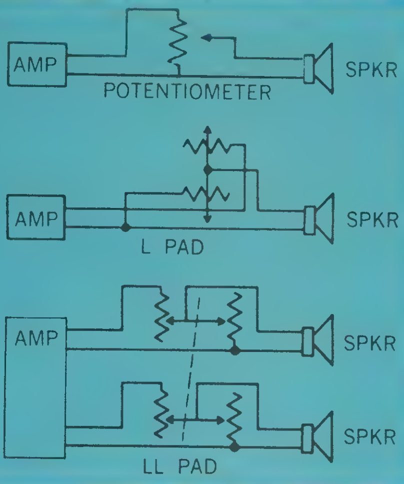


WIDE RANGE 10 WATT EXTENSION SPEAKER

An ideal speaker for use in public address, paging or music systems in schools, churches, industrial, professional, and commercial enterprises. Also well suited for use in the home in connection with a Hi-Fi or music system. Sturdy, solid wood baffle with a powerful 8" "Twin Cone" speaker, with 6 oz. magnet. Conservatively rated at 10 watt. Excellent frequency response. Built-in volume control. Wall mounting bracket included.
Specification: 8 ohm — 10 watt
Size: 12" wide, 10" high, 4¾" deep

Z2-256	Blonde	**$14.90 Net**
Z2-257	Dk. Walnut	**$14.90 Net**

SPEAKER VOLUME CONTROLS — WHICH ONE DO YOU NEED?



Most speaker volume controls are pretty much the same — basically one or more potentiometers (variable resistors) controlling the amount of power to your speaker — even though they're also called audio controls, level controls, and attenuators. To control the volume of a small extension speaker fed by your radio, phonograph, or intercom, all you need is an inexpensive potentiometer — or pot — with the right power rating and resistance value. This circuit's shown in the diagram at right.

With higher quality equipment, like your hi-fi stereo system, the simple pot may cause distortion — since it can't maintain the right impedance to your amplifier and speaker. High quality volume control calls for an "L pad," which is a dual pot that maintains constant load impedance to your amplifier. For stereo, you'll need an LL which are 2 L pads arranged in such a way that both speakers can be controlled with a single knob.

On multiple speaker systems, a considerable improvement can often be obtained in providing separate volume controls for the tweeter and the mid-range speaker. Control of "brilliance" is obtained by varying the tweeter level. "Presence control" is achieved by adjusting the volume of the mid-range unit. Single "L" Pads are the logical choice for these applications.

SPEAKER CONTROLS

CABINET MOUNTING TYPE. "L" Pad circuit with power handling capacity of 10 watt peak audio. For use with 8 to 16 ohm speakers. Long threaded shafts permit installation in cabinets up to 1″ thick. Single hole mounting. Supplied with knob and beautiful gold etched dial plate. Solder terminals.

Cat. No. S2-175	Fig. A	Single "L" Pad	**$1.95 Net**
Cat. No. S2-176	Fig. B	Stereo "LL" Pad	**$3.75 Net**

WALL MOUNTING TYPE. Same circuit and electrical specification as Cabinet Type shown above, but mounted on elegant brushed gold plate which fits standard electrical outlet box. Can also be mounted flush in any wall opening of 2¼″ x 2¾″. Screw terminals.

Cat. No. S2-179	Fig. C	Single "L" Pad	**$2.95 Net**
Cat. No. S2-180	Fig. C	Stereo "LL" Pad	**$3.95 Net**

SMALL POTENTIOMETER TYPE. Designed for use with extension speakers, low-level background music systems, intercoms, etc. Single hole mounting. Fits panels up to 3/16″ thick. Supplied with knob and smart looking etched gold dial plate 2⅛″ square. Designed for speakers from 3 to 16 ohm impedance; max. power: 3 watt audio.

Cat. No. S2-184 Fig. D **$1.15 Net**

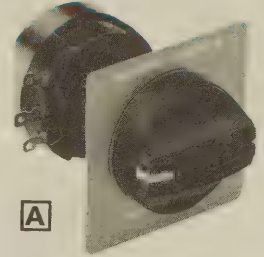
SPEAKER "FADER" CONTROL. A potentiometer control similar to the one listed above, but controls 2 speakers simultaneously. By turning the knob, volume of one speaker increases gradually while diminishing on the second speaker. In center position, both speakers have equal volume.

Cat. No. S2-185 Fig. D **$1.15 Net**

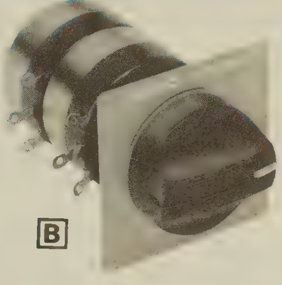
SPEAKER SWITCH

Designed for use with two speakers such as the one in the equipment, plus a remote or two remotes. 3-position switch connects one or the other or both speakers simultaneously. Supplied with 2⅛″ square etched gold dial plate, knob, and mounting hardware.

Cat. No. S2-186 Fig. D **$.99 Net**



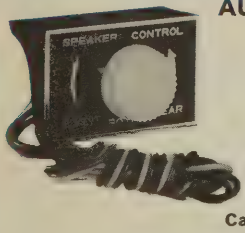
A



B

C

D



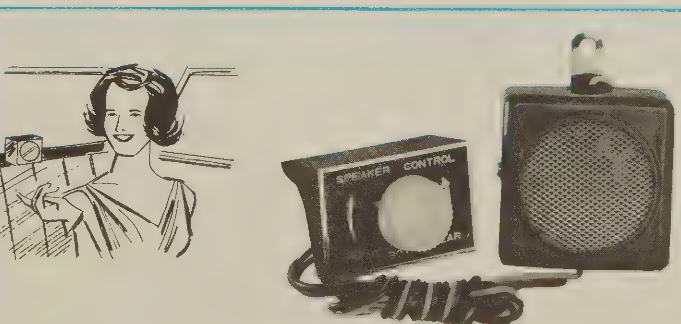
AUTO SPEAKER CONTROLS

REAR SEAT SPEAKER SWITCH. With 3 positions Gives choice of front speaker alone, rear speaker alone, or both together. Comes completely assembled with all hardware and 15 ft. wire—sufficient for the average automobile. Hook-up diagram included. Very easy to install.

Cat. No. S-188 **$.99 Net**

FADER CONTROL. For rear seat speaker. Permits continual control of both speakers with a single knob. Turned to the right—only the front speaker operates; when rotating to the left the rear speaker will fade-in while the volume on the front speaker diminishes. Complete with wire, hardware, and instructions.

Cat. No. S2-189 **$.99 Net**
For speakers with a voice coil impedance of 3 to 8 ohm.
Cat No. S2-190 **$1.10 Net**
For speakers with a voice coil impedance of 12 to 40 ohm.



REAR SEAT EXTENSION AUTO SPEAKER KIT

Ideal for station wagons, convertibles, sport cars. It's pre-wired and can be installed in a few minutes. Small speaker can be clipped on or fastened anywhere with a single screw. Switch selects front, rear, or both speakers. All necessary wire, hardware, and instructions are included.

Cat. No. S2-199 **$3.50 Net**

SPEAKERS — HOW TO PICK 'EM!

A speaker's basically the same construction as a dynamic microphone. While the mike converts sound into a signal, your speaker converts signals back into sound. That's why speakers can double for a mike in intercoms, walkie-talkies, and dictating machines.

Here are the seven factors you'll want to consider in picking speakers.

1. SIZE. Speakers are generally available from less than 2 inches to 15 inches in diameter. Sound quality generally improves as size increases and oval speakers are often a good compromise when space is limited.

2. POWER. Speakers are rated according to their capacity to produce volume without distorting. This rating will range from under ¼ Watt for a small transistor radio speaker to 20 Watts or more for one used in a high quality sound or stereo system.

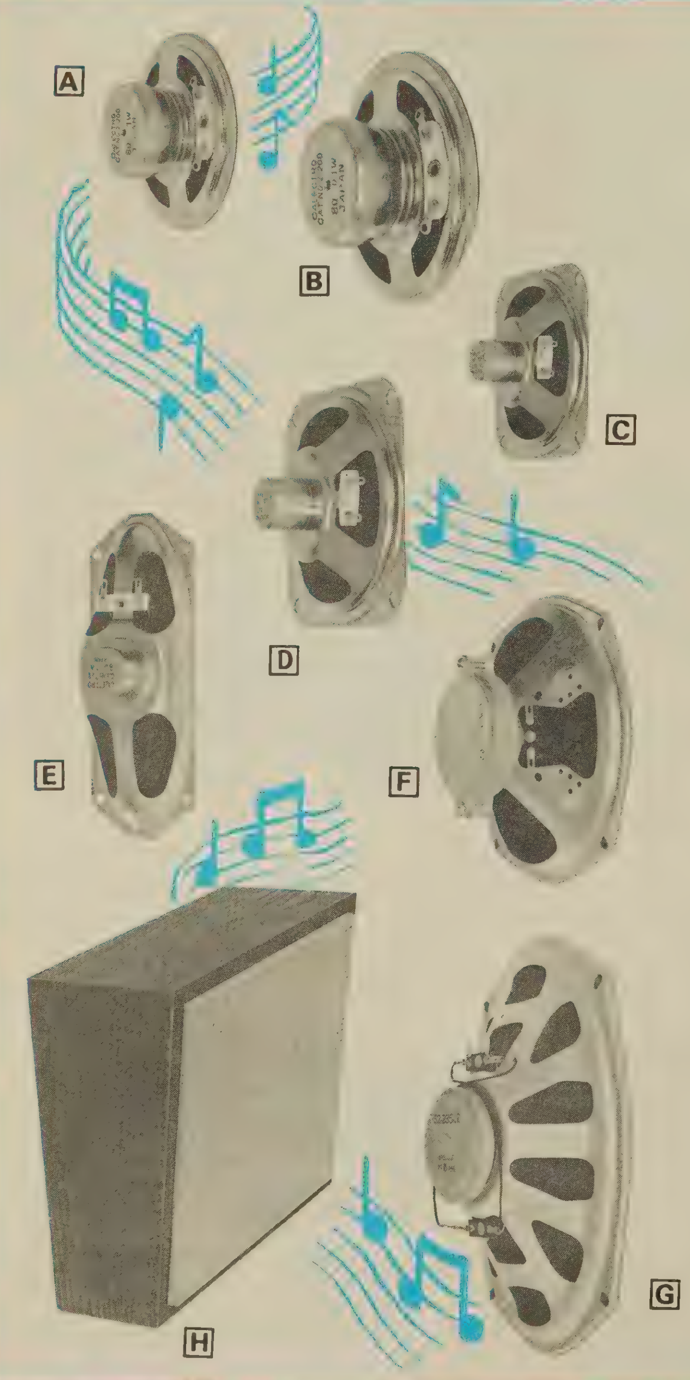
3. FREQUENCY RESPONSE. This indicates the lowest and highest frequencies a speaker'll reproduce, expressed in Hz (cycles per second). It's no foolproof guide to quality, however. Because a speaker producing flat (distortionless) response from 100 to 8,000 Hz will most likely sound better than one rated at 60 to 15,000 Hz with an uneven curve and many resonance peaks.

4. IMPEDANCE MATCHING. Whenever possible, your speaker's impedance (expressed in ohms) should match the impedance of the equipment feeding it. Many radio, TV, and sound systems have 3-4 ohms impedance, while small transistor radios and most home music systems are 8 ohms. 16, 45, and 100 ohms impedance are less frequently used. You usually won't be able to hear a mismatch of two to one or even three to one, but a greater mismatch will cost you power and might even cause some distortion. Watch it when you add extra speakers to your system, because parallel connection decreases while series connection increases impedance. You can usually get the best possible match by mixing series and parallel connections.

5. PHASE MATCHING. In a stereo system, or any other involving more than one speaker driven by the same amplifier, your speakers must be phased so their cones move in and out in unison. Many speaker terminals are marked with a plus sign or colored dot to help you hook up all your speakers in phase. If yours aren't marked, connect a flashlight battery momentarily to your speaker wires to find out which polarity causes the cone to draw in. Then mark one terminal + (plus) and you're on the way to matching all your speakers.

6. ENCLOSURE. Sound waves radiating from the front and back of the speaker cone tend to interfere with each other, causing loss of volume — especially in the lower frequencies. So a proper enclosure — or even a flat baffle — is a must for good sound. Enclosure size should be in proportion to the size of your speaker. So even a cigar box will do for the little 2-3 inch speakers used in science projects.

7. WIRING. Since you must use the right gauge wire to avoid power losses and mismatch distortion, we've included a Speaker Wire Selection Table in the Wire and Cable section of this catalog.



MINIATURE SPEAKERS

Standard small round loudspeakers for use in transistor radios, small tape recorders, walkie talkies, etc. Ideally suited as replacements or in constructing small electronic devices, and for experimental and science projects.

FIG.	DIAM.	IMPED.	CAT. NO.	NET
A	1¾″	8 ohm	S2-200	$ .99
A	2″	8 ohm	S2-202	.99
A	2¼″	8 ohm	S2-203	.99
B	2½″	8 ohm	S2-205	.99
C	2½″	100 ohm	S2-206	1.75
B	3″	8 ohm	S2-209	1.10

SMALL OVAL AND 4″ SPEAKERS

These are ideal speakers for small to medium size electronic and communication equipment such as radios, TV's, phonographs, small sound systems, intercoms, etc. The oval type combines excellent sound with minimum height requirement.

FIG.	DIAM.	IMPED.	CAT. NO.	NET
E	2¼″ x 6″	8 ohm	S2-211	$1.90
D	4″	8 ohm	S2-212	1.35
D	4″	45 ohm	S2-213	1.75

STANDARD HIGH QUALITY SPEAKERS

These are "professional quality" speakers for practically any application in homes, offices, schools, auditoriums, restaurants, churches, and industrial installations. They are ideal as extension speakers for radio, TV, or automobiles, for music or public address systems, etc. These speakers have been designed for best overall frequency response in a single speaker. They have excellent power handling capacity, good sensitivity, and long life. All have powerful, large magnets, seamless cone and heavy gauge, drawn steel housing.

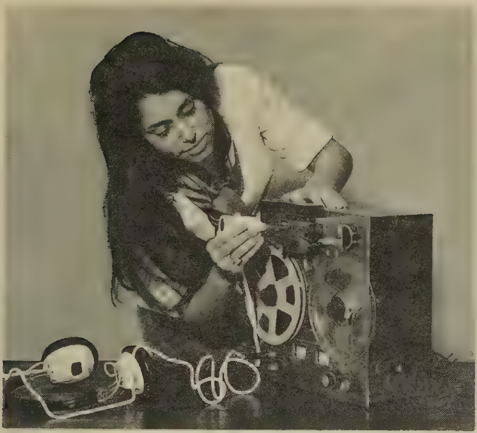
FIG.	SIZE	MAGNET	POWER	CONE			IMPED. OHM	CAT. NO.	NET
				Single	Twin	Mylar*			
F	6″	4.8 oz.	8 W		X		3.2	S2-218	$4.98
F	8″	6 oz.	10 W	X		X	3.2	S2-220	5.98
F	8″	6 oz.	10 W		X		8	S2-222	6.20
G	5 x 7″	3 oz.	6 W	X			3.2	S2-230	4.60
G	5 x 7″	3 oz.	6 W	X			10/20/40	S2-231	5.40
G	6 x 9″	3 oz.	8 W	X			3.2	S2-234	4.98
G	6 x 9″	3 oz.	8 W		X		10/20/40	S2-235	5.60

*Weather-resistant. Suitable for outdoor installations.

SPEAKER BAFFLES

Solid, resonance-free construction. Clean functional styling and attractive wood finish will blend with any surrounding — from home to industrial application. Beautifully modern, woven plastic grill cloth. Wall mounting bracket included. Designed for all standard 8 inch speakers. 12″ wide, 10″ high, and 5″ deep.

FIG.	CAT. NO.		NET
H	Z2-250	Blonde	$7.75
H	Z2-251	Walnut	7.75



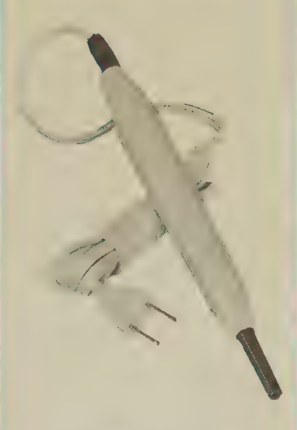
TAPE HEAD DEMAGNETIZERS

These are indispensable accessories to maintain frequency response and assure noise-free recording and reproduction. They are designed for use on single through 8 track equipment and are equally useful in servicing magnetic dictating machines, video recorders, etc.

STANDARD DEMAGNETIZER

Works on regular house current. Just plug in, move pointed tip in front of heads and tape guides, and all residual magnetism is removed in less than a minute. Fits practically any reel-to-reel equipment — usually without even removing the head cover. Tip is protected with resilient plastic to prevent scratching of any delicate part of the equipment.

Cat. No. Q4-234 $3.45 Net



CARTRIDGE TYPE DEMAGNETIZER

Designed for use with home recorders and players using the standard 4 or 8 track slip-in cartridge. Plugs in wall outlet and has the same features as the Standard Reel Type Demagnetizer. Special long, blunt tip reaches the recessed heads in all cartridge type equipment.

Cat. No. Q4-235 $4.50

CAR STEREO PLAYER DEMAGNETIZER

This device operates from the 12-volt battery in the car. Plugs into the cigarette lighter socket in the automobile. A strong alternating magnetic field, necessary for effective demagnetization, is created by a transistorized electronic circuit built in the unit. When used once or twice a month, this demagnetizer will prevent your valuable stereo tapes from becoming noisy, and will restore frequency response for clean, clear sound.

Cat. No. Q4-233 $5.95 Net

TAPE RECORDERS — CARE AND FEEDING OF!

Taking care of your tape recorder — or your auto or home stereo player — is a must. Skip it and you'll soon start missing some of the performance you paid for. Worse yet, you may permanently damage your valuable tapes!

Good thing this is such an easy job that you can do it yourself, and in only a few minutes, too.

There are just two simple things you'll want to do regularly — clean your machine's tape heads and de-magnetize them. You may as well do both jobs at the same time — either weekly, semi-monthly, or monthly, depending on how much you use your machine. Once for every 8 hours of use is a good rule of thumb.

Cleaning's necessary because even the best tape sheds a little oxide every time you run it through your machine. This doesn't hurt the tape, but it will eventually affect the heads' ability to deliver clean sound. Use a good head cleaner/lubricant and cotton-tipped applicators to clean the heads themselves. Then, while you're at it, use a cleaner to clean rubber capstan rollers and other parts the tape travels over.

You need to de-magnetize your record and/or playback heads because magnetism builds up on them. Forget the erase head. It de-magnetizes itself. But, the other head (or heads) on your machine can become magnetized. Then they create noise — especially hiss — and distortion during both recording and playback.

Magnetized heads can even permanently damage your valuable tapes by erasing high frequencies and adding noise. Once that happens, they've had it. Reverse the process? No way!

What you need to prevent all this is a head de-magnetizer. Use it according to directions — but make sure your recorder's turned off.

And, you can use this device to de-magnetize watches, tape splicers, hand tools, etc.

TAPE RECORDER AND PLAYER MAINTENANCE KIT

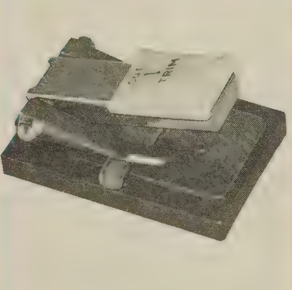
Contains everything to clean and lubricate heads, guides and capstans. Indispensable to maintain efficiency and increase the life of conventional tape recorders, auto and cassette units, video tape recorders and any other equipment using magnetic tape. Contains two 2-oz. bottles of head cleaner and lubricant, cleaning brushes, long handle cotton swabs, and complete directions for use — all in a convenient clear plastic case.

Cat. No. Q4-237 $2.25 Net

TAPE HEAD CLEANER

A special formula cleaner-lubricant which quickly dissolves accumulated oxide particle deposits on tape recorder heads. Leaves light film of lubricant to prevent tape squeal. Just dip cotton swab (several included) in cleaner, rub against tape heads, guides, etc., and restore full fidelity.

Cat. No. Q4-236 $ 85 Net
1 oz.



TAPE SPLICER

Clean, permanent splices in seconds. Keeps tape in perfect alignment with spring loaded "fingers." Makes diagonal, true professional splices and trims edges to remove any excess splicing tape.

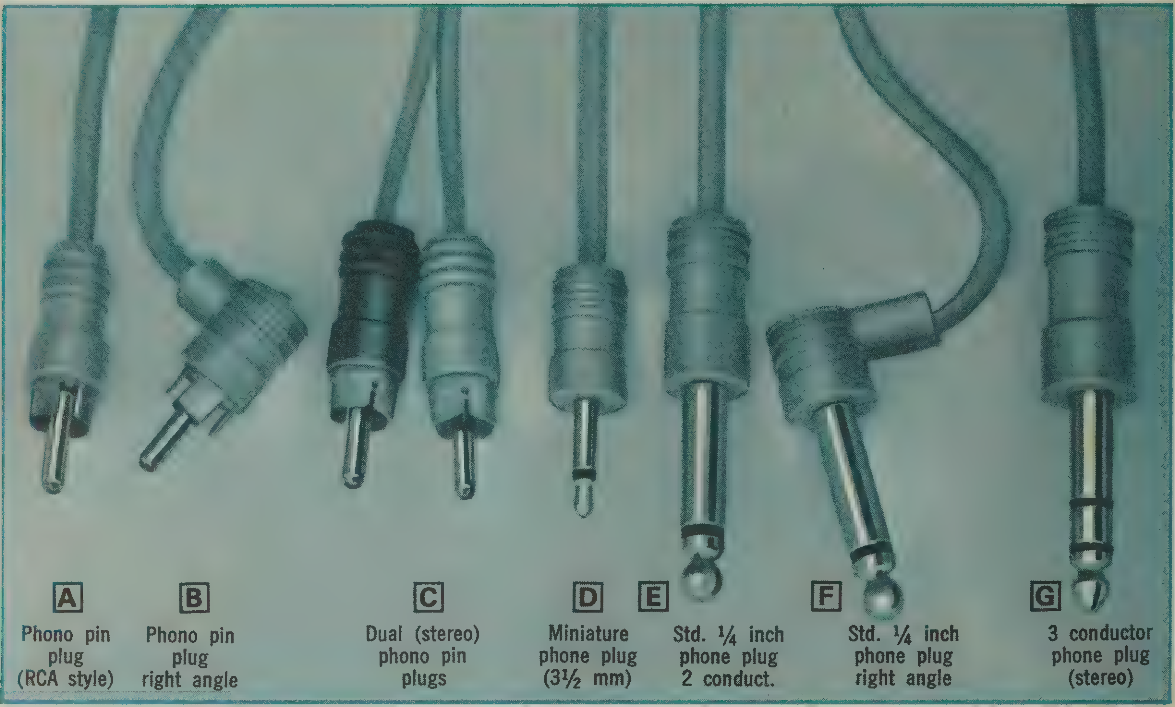
Cat. No. Q4-229 $2.29 Net
(For all standard ¼" recording tape)

SPLICING TAPE

Extra strength Mylar* tape with special adhesive for use on any type of recording tape. Makes a permanent, professional splice.

Cat. No. Q4-231 $ .39 Net
½" x 100"

*T.M. DuPont Co.

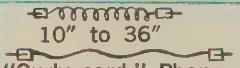

A
Phono pin plug (RCA style)
B
Phono pin plug right angle
C
Dual (stereo) phono pin plugs
D
Miniature phone plug (3½ mm)
E
Std. ¼ inch phone plug 2 conduct.
F
Std. ¼ inch phone plug right angle
G
3 conductor phone plug (stereo)

AUDIO CABLES

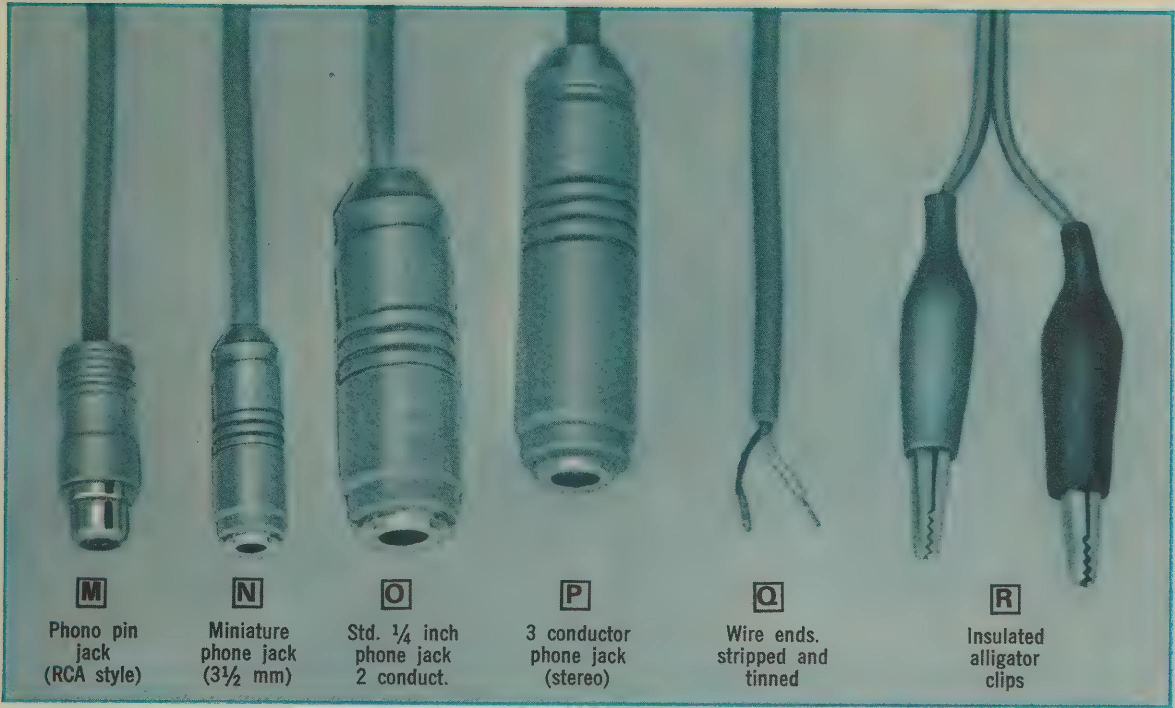
Calectro connecting cables are made with finest low-loss shielded wire, carefully assembled and molded. They are guaranteed to give years of trouble-free service.

Before buying a cable or adaptor, be sure you know the correct size and type of end connectors. To facilitate the selection, we have shown above the various styles and types in approximate **actual size.**

Always select a cable of sufficient length to prevent strain on the connectors or sharp bends in the cable.

ENDS	DESCRIPTION	FEET	CAT. NO.	NET
C to C	Stereo (dual) cable. Phono pin plugs on all 4 ends. (color coded).	3 6 12	**Q4-241** **Q4-242** **Q4-243**	**1.39** **1.69** **2.25**
A to A	Phono pin plugs on each end	1½ 3 6 12	**Q4-245** **Q4-250** **Q4-252** **Q4-253**	**.65** **.76** **.89** **1.25**
A to A	 10″ to 36″ "Curly cord." Phono pin plug on each end.	3	**Q4-251**	**.98**
B to B	Right angle phono pin plugs on each end	6	**Q4-249**	**.93**
A to M	Phono pin plug one end; Phono pin jack other end	6	**Q4-254**	**1.25**
A to Q	Phone pin plug one end; Other end stripped and tinned.	6	**Q4-256**	**.76**
B to R	Right angle phono pin plug one end; Other end alligator clips; Not shielded	10	**Q4-258**	**1.25**
M to M	Phono pin jacks on both ends	6	**Q4-285**	**.93**

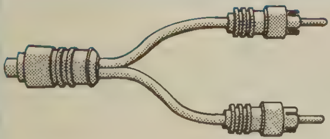
ENDS	DESCRIPTION	FEET	CAT. NO.	NET
E to E	Std. ¼″ phone plug on both ends.	6	**Q4-265**	**1.29**
E to F	Std. ¼″ phone plug one end; Other end right angle ¼″ phone plug	12	**Q4-266**	**1.39**
E to D	Std. ¼″ phone plug one end; Other end miniature (3½mm) phone plug	6	**Q4-261**	**.98**
F to A	Right angle ¼″ phone plug one end; Other end phono pin plug	6	**Q4-263**	**1.10**
E to A	Std. ¼″ phone plug one end; Other end phono pin plug	6	**Q4-264**	**1.10**
E to Q	Std. ¼″ phone plug one end; Other end stripped and tinned	6	**Q4-267**	**.93**
E to R	Std. ¼″ phone plug one end; other end insul. alligator clips; Not shielded	10	**Q4-260**	**1.19**
E to O	Std. ¼″ phone plug one end; Other end ¼″ phone jack (extension cord)	10	**Q4-262**	**1.75**


M
Phono pin jack (RCA style)
N
Miniature phone jack (3½ mm)
O
Std. ¼ inch phone jack 2 conduct.
P
3 conductor phone jack (stereo)
Q
Wire ends. stripped and tinned
R
Insulated alligator clips

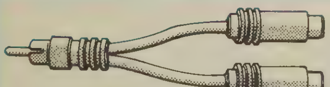
ENDS	DESCRIPTION	FEET	CAT. NO.	NET
D to D	Miniature (3½mm) phone plugs both ends	6	**Q4-275**	**.98**
D to A	Miniature (3½mm) phone plug on end; Other end phono pin plug	6	**Q4-270**	**.85**
D to N	Miniature (3½mm) phone plug one end; Other end miniature phone jack (extension cord)	6	**Q4-274**	**.98**

ENDS	DESCRIPTION	FEET	CAT. NO.	NET
D to Q	Miniature (3½mm) phone plug one end; Other end stripped and tinned	10	**Q4-272**	**.85**
G to P	Stereo headphone extension cord. 3-conductor phone plug one end; Other end 3-cond. jack.	20	**Q4-278**	**2.99**
E to F	"Coiled" cord with straight ¼" phone plug one end; Other end right angle ¼" phone plug	10 20	**Q4-279** **Q4-281**	**2.69** **3.69**

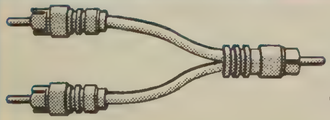
AUDIO ADAPTORS



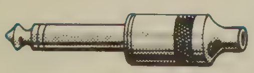
"Y" ADAPTOR. One end phono pin jack; other end 2 phono pin plugs.
Cat. No. Q4-288 **$ .99 Net**



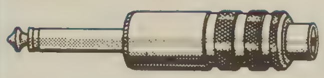
"Y" ADAPTOR. One end phono pin plug; other end 2 phono pin jacks.
Cat. No. Q4-289 **$1.05 Net**



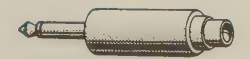
"Y" ADAPTOR. Phono pin plugs all 3 ends.
Cat. No. Q4-290 **$1.05 Net**



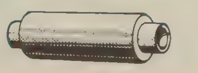
Std. ¼" phone plug one end; other end min. (3½ mm) phone jack. Adapts cord with min. phone plug to input designed for a std. ¼" phone plug
Cat. No. Q4-292 **$ .85 Net**



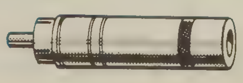
Std. ¼" phone plug one end; other end phono pin jack. Adapts cord with phono pin plug to input designed for a std. ¼" phone plug.
Cat. No. Q4-293 **$ .85 Net**



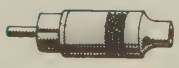
Min. (3½ mm) phone plug one end; other end phono pin jack. Adapts cord with phono pin plug to input designed for a min. phone plug.
Cat. No. Q4-294 **$ .85 Net**



Phono pin jacks both ends. Used for connecting cords with phono pin plugs at free ends.
Cat. No. Q4-296 **$ .85 Net**



Phono pin plug one end; other end std. ¼" phone jack. Adapts cords with a std. ¼" phone plug to input desiged for a phono pin plug.
Cat. No. Q4-297 **$ .85 Net**

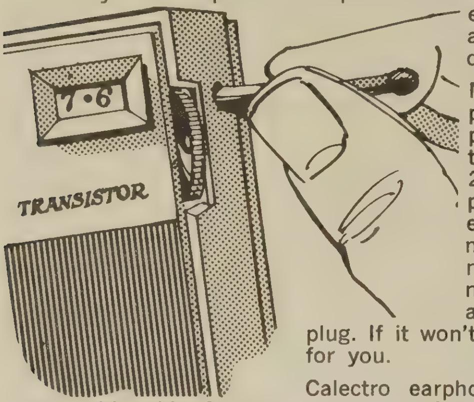


Phono pin plug one end; other end min. (3½ mm) phone jack. Adapts cords with a min. (3½ mm) phone plug to input designed for a phono pin plug.
Cat. No. Q4-298 **$ .79 Net**

EARPHONES — WHICH ONE DO YOU NEED?

Earphones come in two types, and with two different sizes of plugs. So you'll need to find one that matches the radio, recorder, or other equipment you plan to use with it.

First, check to see if your equipment's output is low or high impedance. If you can't tell from the instructions or the markings, try a low impedance earphone. It's the most popular type and will even work with high impedance outputs, though cutting down volume.



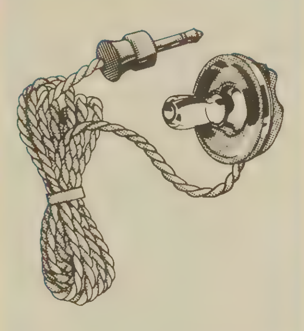
Now determine which size plug you need. Subminiature plugs are slightly larger than the lead in a wooden pencil: 2½ mm. Miniature (mini) plugs have a diameter about equal to the width of a paper match: 3½ mm. So, if a paper match fits into your equipment's output jack, you need an earphone with a miniature plug. If it won't, then a subminiature plug's for you.

Calectro earphones are the dynamic type with wide frequency response for excellent sound. They have plastic ear plugs and their ear hangers are reversible, so you can use 'em on either ear!

DYNAMIC EARPHONES

IMPED.*	PLUG	CORD LENGTH	CAT. NO.	NET PRICE
Low	Sub-min.	3′	Q4-215	$ .99
Low	Sub-min.	12′	Q4-218	1.25
Low	Mini.	3′	Q4-219	.99
Low	Mini.	12′	Q4-222	1.25
High	Mini.	3′	Q4-223	.99

*Low = 4 to 16 ohm/ High = 500 to 3,000 ohm



CRYSTAL EARPHONE

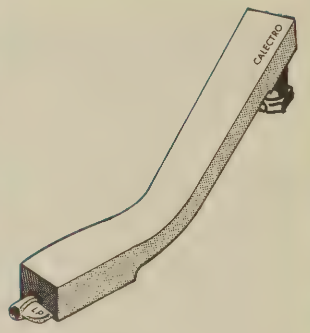
Popular with experimenters and hobbyists. Very sensitive. May be used as microphone by removing earplug. High impedance. With cord and miniature (3½mm) plug.

Q4-213 **$ .99 Net**

PILLOW SPEAKER

Enjoy listening without disturbing others. Excellent sound. With mini phone plug to fit most transistor radios. Dynamic type; 8 ohm impedance.

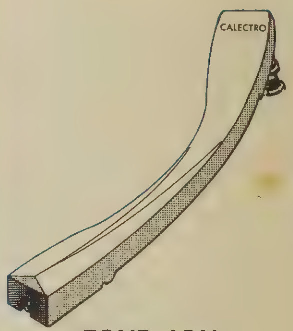
N4-042 **$2.95 Net**



ALL SPEED TONE ARMS

Universal Replacement Arms with turnover cartridge and sapphire needles. Arm Rest included.

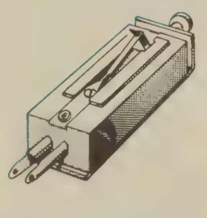
S2-288 Mono 2.2 V **$2.75**
S2-289 Stereo 1.0 V **$3.25**



TONE ARM MONAURAL

A low cost general replacement Tone Arm of good quality, with single sapphire needle for 33-45 RPM phonographs. Output 3 Volt. Arm rest included.

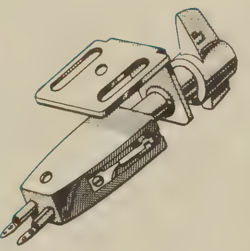
S2-287 **$2.25 Net**



MONAURAL 33/45 PHONO CARTRIDGE

Single screw front mounting. Replacement for many small phonographs. Sapphire stylus; output 3½ volt.

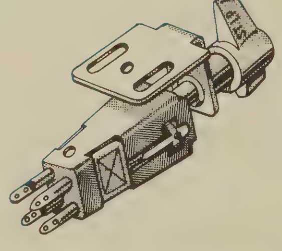
S2-294 **$1.49 Net**



MONAURAL 33/45/78 PHONO CARTRIDGE

Universal replacement for certain models of VM, BSR, Astatic, Collaro, etc. Two sapphire needles; output 2.2 volt.

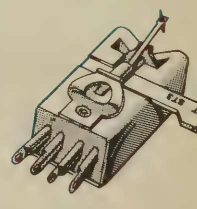
S2-295 **$1.95 Net**



STEREO—ALL SPEED PHONO CARTRIDGE

Universal replacement for many types of VM, Columbia, Westinghouse, Decca, Garrard, etc. Two sapphire needles; output 1½ volt.

S2-296 **$2.75 Net**

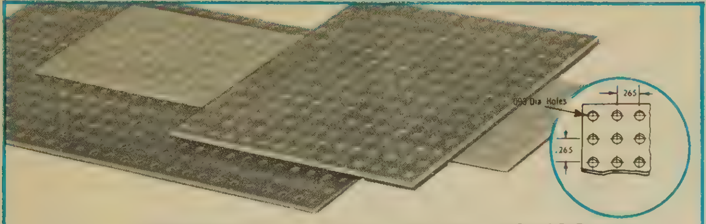


STEREO—ALL SPEED PHONO CARTRIDGE

Flip stem style. Universal replacement for most phonos using this style cartridge. High quality reproduction. 2 sapphire needles; output 0.4 volt.

S2-297 **$2.90 Net**

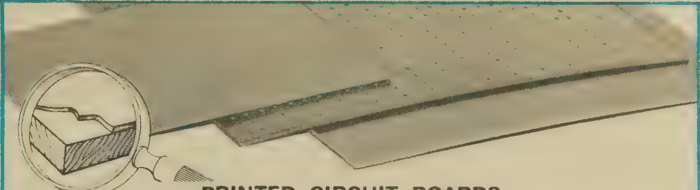
EXPERIMENTER AND LAB SUPPLIES FOR "BREADBOARDING" AND PRINTED CIRCUIT DESIGN



PERFORATED PLASTIC CIRCUIT BOARDS

Unexcelled for prototypes, breadboards, hobby or science projects. Made of tough mil-spec phenolic with clean punched holes.

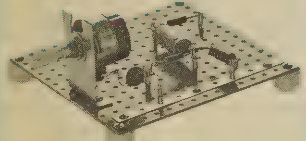
Cat. No.	Size	Net
J4-612	3" x 4"	$.55
J4-614	2" x 8"	.65
J4-616	4" x 8"	.99



PRINTED CIRCUIT BOARDS

Copper clad phenolic boards for making printed (etched) circuits in the lab, school, or home workshop. The punched (perforated) board has 1/16" holes spaced approx. 3/16".

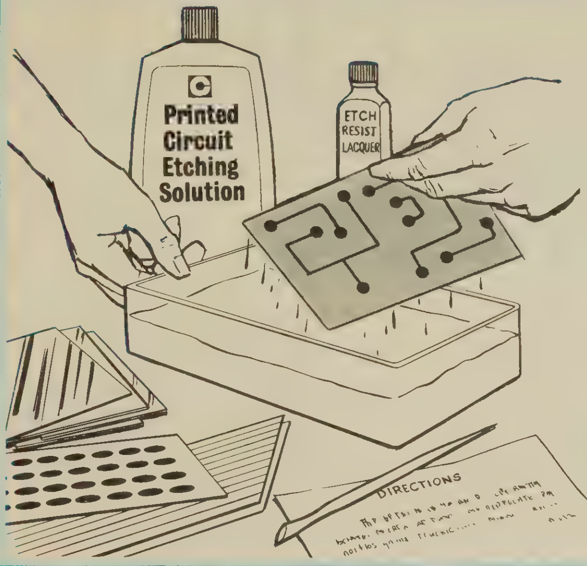
Cat. No.	Size	Net
J4-604	4" x 6" (unpunched)	$.59
J4-605	4½" x 6" (punched)	.98
J4-608	Assortment of 4 unpunched boards, 2¼" x 3" (2); 2" x 4½" and 3" x 4½"	.95



EXPERIMENTER'S CIRCUIT BOARD KIT

Contains a 3¾" x 4" perforated board, 15 terminals (No. J4-636) and 4 rubber feet with mounting screws. Just the thing to build small circuits, hobby and science projects, etc.

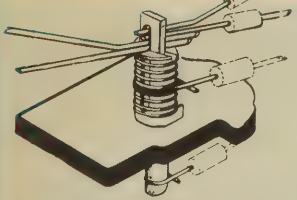
Cat. No. J4-660 $.98 **Net**



PRINTED CIRCUIT KIT

A complete assortment of all materials needed for producing really professional printed (etched) circuits — without prior experience or special skill. Kit contains 4½" x 3", 4½" x 2", and 2¼" x 3" (2) copper clad boards, etching solution, etch resist lacquer, layout strips and circles, polishing pad, and burnishing tool. With instruction manual and plastic case which serves as etching tank.

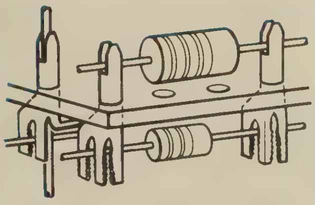
Cat. No. J4-659 **$3.75 Net**



BREADBOARD TERMINALS (Solderless)

For experimental circuits where quick connecting and disconnecting of components is desirable. Press-fit in perforated circuit boards.

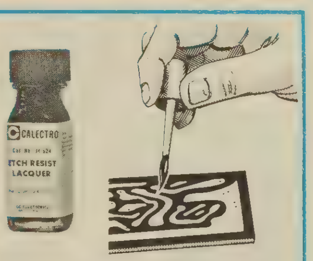
J4-634 Pkg. of 10 **$.99 Net**



BREADBOARD TERMINALS (Solder Type)

Push-in terminals for all standard perforated circuit boards with .093" holes. Easy to solder.

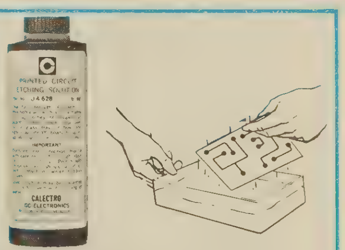
J4-636 Pkg. of 30 **$.79 Net**



ETCH RESIST LACQUER

Fast drying, easy to apply lacquer to draw the circuit on the P.C. Board. Supplied with small brush attached to bottle cap.

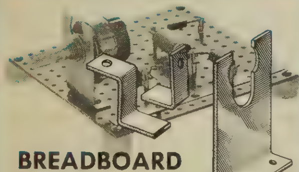
J4-624 **$.60 Net**



P.C. ETCH SOLUTION

Fast acting ferric chloride solution to dissolve copper layer on boards. Safe and easy to use. Sufficient for about 100 sq. inches.

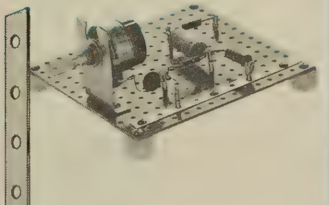
J4-628 6 oz. **$1.19 Net**



BREADBOARD BRACKETS

For attaching sockets, switches, controls, meters, jacks, etc., to circuit boards.

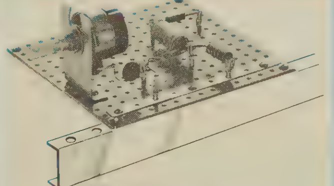
J4-640 Pkg. of 10 "Z" **$.29**
J4-642 Pkg. of 10 "L" **.25**
J4-644 **.39**
3 Switch & Control Brackets



BUS STRIP

To provide a common ground across a circuit board. Punched to line up with perforations. Made of tinned brass.

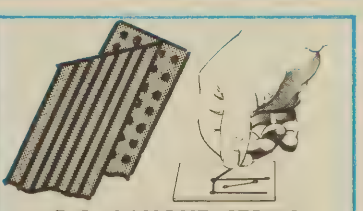
J4-647 7½" **$.25 Net**



CIRCUIT BOARD SUPPORT BRACKETS

For professional breadboarding. Provides clearance for wires, terminals, and components. Sturdy aluminum, 1" x 8" with mounting holes.

J4-632 Pkg. of 2 **$.75 Net**

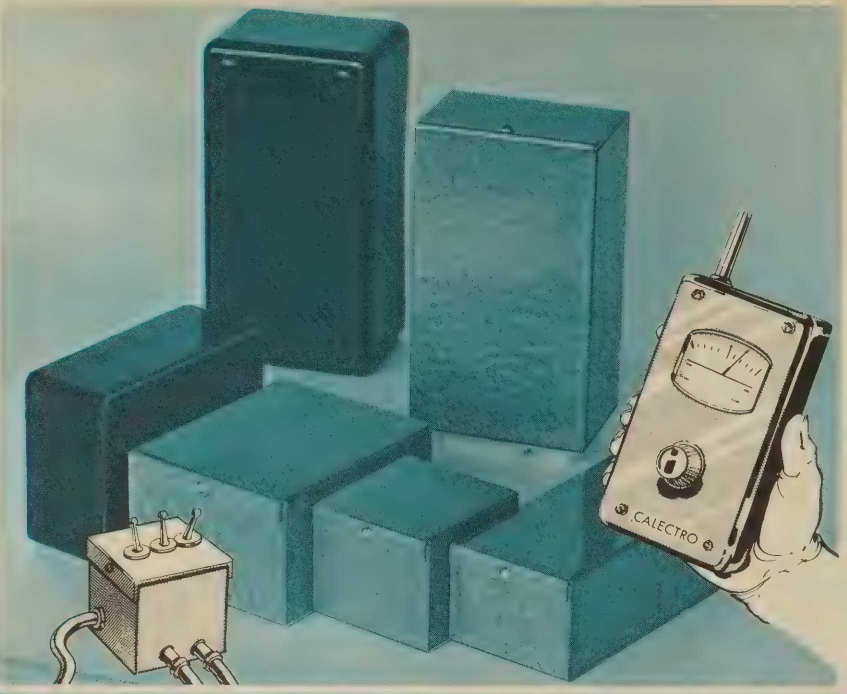


P.C. LAYOUT STRIPS AND CIRCLES

Etch resist, pressure sensitive strips, 1/16" and 1/8" wide and 3/16" circles. For neat, professional layout of etched "wiring."

J4-620 Asst. **$1.19 Net**

CHASSIS BOXES AND INSTRUMENT CASES



Ideal for controls, switching circuits, small testers and meters, hobby projects, etc.

PLASTIC INSTRUMENT CASES Molded of heavy black phenolic with polished surfaces. The finest boxes obtainable. Lid is recessed and is attached with 4 screws (supplied).

Cat. No. J4-725	2⅝″ x 3¾″ x 1½″	**$1.39 Net**
Cat. No. J4-727	2¾″ x 5½″ x 1⅞″	**1.59 Net**
Cat. No. J4-726	3½″ x 6″ x 1⅝″	**1.69 Net**

ALUMINUM CHASSIS BOXES Attractive grey hammertone finish. Two-piece snap-lock construction for quick assembly. This design permits installation of maximum number of components and makes wiring very easy.

Cat. No. J4-735	2¼″ x 1⅜″ x 1½″	**$ .67 Net**
Cat. No. J4-736	2-5/16″ x 2⅛″ x 1¾″	**.75 Net**
Cat. No. J4-737	3¼″ x 2⅛″ x 1⅝″	**.95 Net**
Cat. No. J4-738	4″ x 2⅛″ x ⅝″	**.99 Net**
Cat. No. J4-739	3¾″ x 3″ x 2⅛″	**1.29 Net**
Cat. No. J4-740	5″ x 2¼″ x 2¼″	**1.29 Net**
Cat. No. J4-741	5¼″ x 3″ x 2⅛″	**1.49 Net**

"JUMPER" WIRE SET

Handy 15″ long test leads with small, insulated alligator clips attached to ends. Ideal for breadboarding, experiments, temporary hookups, etc.
Package contains 2 each black, red, white, green, and yellow Jumpers.

J4-650 **$1.19 Net**
Pkg. of 10 leads

CODE PRACTICE SET

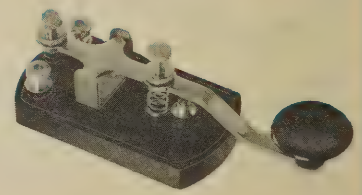
Consists of telegraph key and signal unit, containing high quality buzzer, battery (penlight cell included), and cable with terminals. Key and signal unit can be connected with a long wire for "remote" signaling.

J4-822 **$3.49 Net**

TELEGRAPH KEY

The perfect key for the "novice" to practice code. Adjustable tension and contact spacing. Silver contacts.

J4-820 **$1.19 Net**



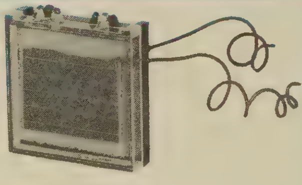


PHOTO CELL

Photo resistive, cadmium sulfide type. Changes resistance with light. For many technical applications and science projects. High resistance in darkness — low when illuminated. Specification: 12K ohm min. @ 0.1 ft/c'dl — 250 ohm @ 100 ft/c'dl. Max. power dissip. 75 mw.

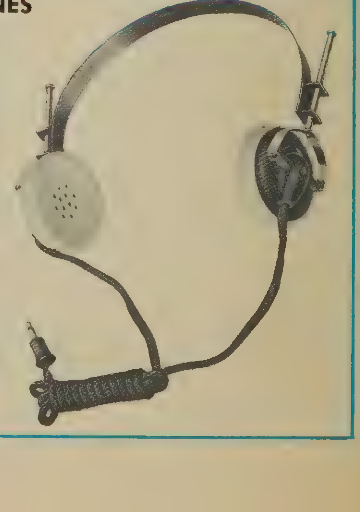
Cat. No. J4-805 **$1.35 Net**

SILICON SOLAR CELLS

Generate electricity when illuminated. Used for counters, control circuits, and to power small electronic devices such as radios; charges batteries. Same as used in satellites. Supplied in plastic case. Current output in bright sunlight: 25 to 30 ma. Connect several in series for higher voltage and in parallel for higher current.

Cat. No. J4-800	.5 Volt	**$1.95 Net**
Cat. No. J4-803	1.4 Volt	**4.50 Net**

EXPERIMENTER HEADPHONES



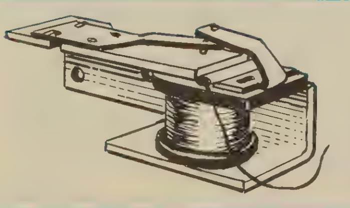
Lightweight, double phones with adjustable headband for comfortable fit. Excellent sensitivity and clear sound, especially on voice. Frequency response: 300-3000 Hz.

High impedance model (2,000 ohm). Cord is terminated with 2 phone tips.

J4-825 **$2.95 Net**

Low impedance model (8 ohm). Cord has miniature (3½ mm) phone plug.

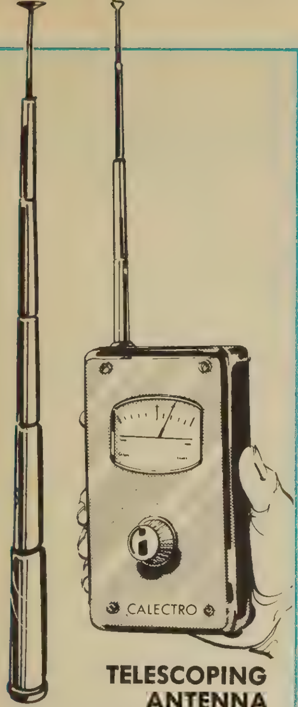
J4-826 **$2.95 Net**



SIGNAL BUZZER

For signal or alarm systems or code practice. Loud and clear tone. Operates on single 1½ volt flashlight cell.

Cat. No. J4-810 **$.95 Net**



TELESCOPING ANTENNA

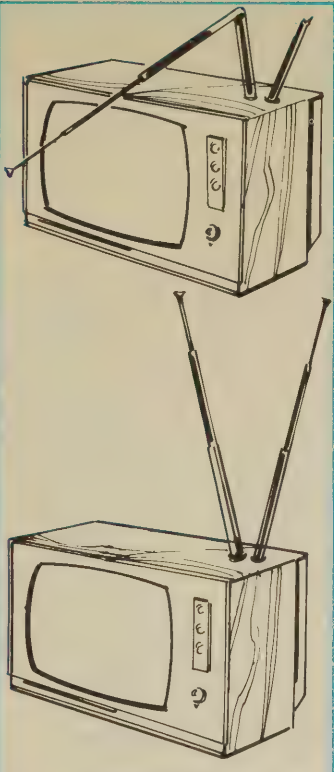
For radios, science projects, wireless mikes, etc. 6 sections extend from 7" to 36". Mounts with a 6-32 screw.

J4-850 **$1.19 Net**

DELUXE ANTENNA

For walkie talkies or replacement on FM and shortwave radios. 10 sections extend from 6¼" to 52"; with adaptors to fit 6-32 and 8-32 threads or fastens with 6-32 screw.

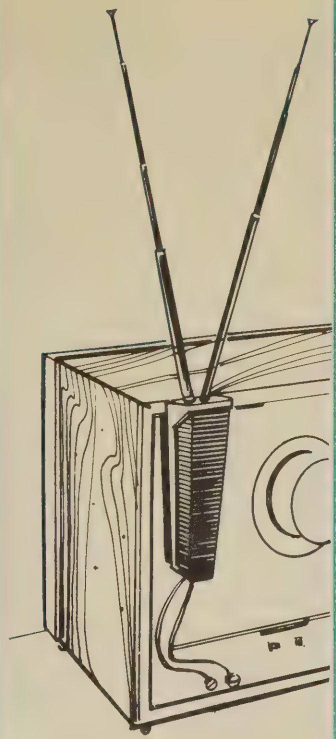
J4-851 **$2.25 Net**



REPLACEMENT TV ANTENNA ELEMENTS

Replaces broken element of "builit-in" TV antenna. Fits 90% of all sets. Easy to install. Extended length 38".

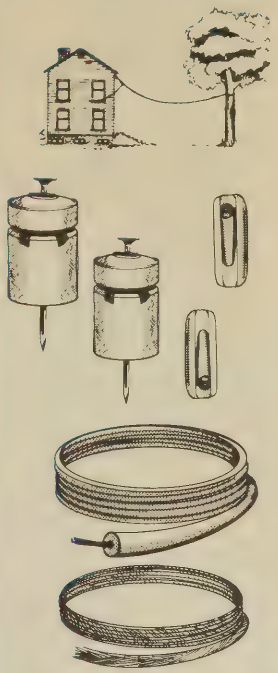
Cat. No. 32-323 **$1.49 Net**
4 sections
Cat. No. 32-325 **$1.79 Net**
5 sections



BACK-OF-SET TV ANTENNA

Often preferred to top-of-set antennas. Mounts with screws to back or side of set. Pivots in all directions and disappears in housing when not in use.

Cat. No. 32-304 **$2.75 Net**



ALL WAVE OUTDOOR ANTENNA KIT

For shortwave or long distance broadcast reception. Also ideal for "projects" such as crystal or one to three transistor radios requiring an outside antenna. Kit contains 50 ft. aerial wire, 25 ft. lead-in, and all necessary hardware.

J4-857 **$2.75 Net**

SCREW AND NUT ASSORTMENTS

Handy assortment of most used sizes for electronic experimenters, workshops, labs, schools, etc. Contain generous quantities of ¼" – ½" – ¾" long screws with nuts to match.

Cat. No. J4-833	Size: 2-56	**$ .99 Net**
Cat. No. J4-834	Size: 4-40	**.99 Net**
Cat. No. J4-835	Size: 6-32	**.99 Net**

SHEET METAL SCREW ASSORTMENT

Popular sizes used in radio, TV and experimental electronics. All are pointed, hardened, and have slotted hex head. Sizes: 4 x ⅜" — 6 x ⅜" — 6 x ⅝" — 8 x ½".

Cat. No. J4-838 Assortment **$ .99 Net**

GROMMET ASSORTMENT

Generous assortment of the four most popular sizes used in electronic assembly. Made of soft, non-hardening vinyl plastic.

Cat. No. J4-841 Assortment **$ .99 Net**

TERMINAL LUG ASSORTMENT

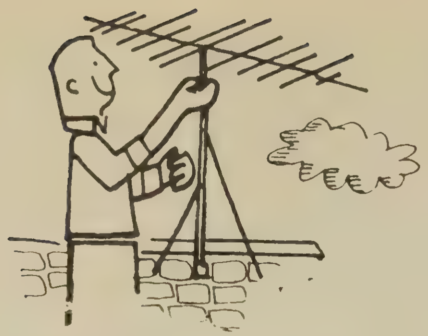
A selection of solder and crimp type terminals for various wire and screw sizes. One of the handiest items in the lab or workshop.

Cat. No. J4-844 Assortment **$ .99 Net**

SPACER ASSORTMENT

Contains various length of metal and insulated spacers to fit No. 4 and 6 screws. Indispensable for construction projects, breadboard and experimental circuits or prototype work.

Cat. No. J4-846 Assortment **$ .99 Net**



TV Antennas—how to install 'em!

It's easy to install your own TV antenna. Just be sure you get one powerful enough to pull in clear pictures at whatever distance you are from the transmitters. Your local electronic parts distributor can advise you best.

Before attempting to install your new antenna, take time to determine just where and how high it should be — as well as taking necessary precautions against wind, lightning, and interference from or with trees or utility wires. In good reception areas, a 5 ft. mast is often sufficient to clear obstacles like buildings, signs, etc.

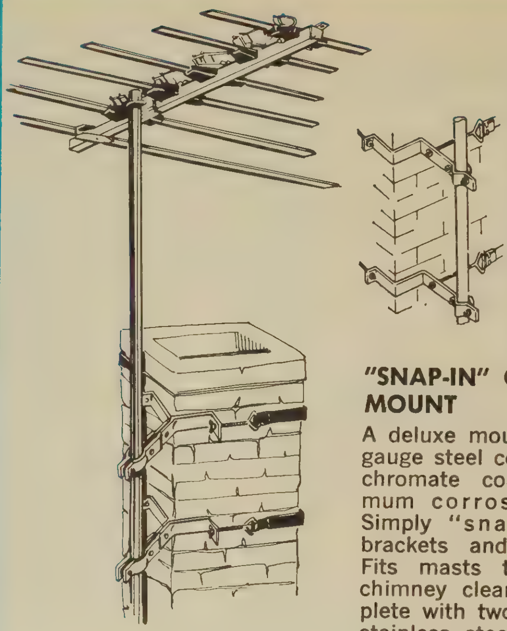
You'll need guy wires for any mast that's 10 ft. or higher, and maybe even on a shorter mast. Select a base that won't let the antenna turn or slip, as well as protecting your roof. There are special fittings that let you clamp a mast to your chimney or vent pipe.

The right lead-in wire is essential to good reception. The most efficient — especially for UHF and color — is foam cable, though the standard flat twin-lead gets the job done in strong signal areas. If you have interference from motors, automobiles or other sources, or if you must run your lead close to metal pipes or gutters, you'd better use shielded 300 ohm cable, even though it's not as efficient as foam or twin-lead. Coax is also good, but has even higher loss and requires matching transformers at both antenna and set. Be sure to use stand-offs with either foam or twin-lead. They secure your cable from the wind while keeping it away from your mast and building. Use them every 4 to 6 ft. and squeeze them with pliers to secure the cable.

For VHF only, you only need one lead-in cable from your antenna to the set. For VHF and UHF, it'll depend on your antenna. Separate VHF and UHF antennas mean you'll need two separate cables, spaced a few inches apart. Or, use only one, plus a coupler-combiner at the antenna, along with a signal splitter at the set. Combination VHF-UHF antennas need only one cable, with a signal splitter at the set.

For safety's sake, always include a lightning arrestor in your installation!

ANTENNA INSTALLATION ACCESSORIES



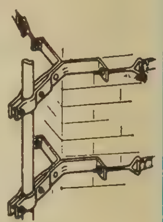
CHIMNEY "QUICK" MOUNT

A low cost, good quality mount for small to medium size antennas. Easy to install. Heavy zinc plated and chromate coated to resist corrosion. Fits masts up to 1½" diam.; chimney clearance: 3"; with two 12' length of galvanized ¾" wide strapping and all necessary hardware.

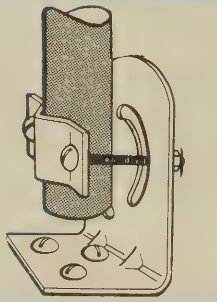
32-010-1 1 pair **$3.27 List**

"SNAP-IN" CHIMNEY MOUNT

A deluxe mount. Extra heavy gauge steel construction zinc-chromate coated for maximum corrosion resistance. Simply "snap" mast into brackets and tighten bolts. Fits masts to 1¾" diam.; chimney clearance: 4"; complete with two 12' lengths of stainless steel strapping and all required hardware.



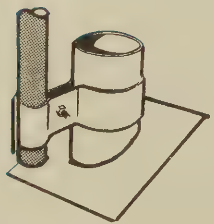
32-000 1 pair **$6.00 List**



"SWING-UP" ROOF MOUNT

Adjusts to any angle. Fits masts up to 1¾" diam. For roof or wall mounting. Heavy plated steel, double protected against corrosion. For guy wire and other necessary hardware see next page.

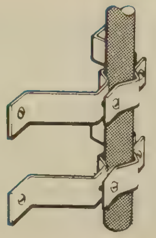
Cat. No. 32-008 **List $1.22**



VENT MOUNT

For attaching masts to plumbing vents up to 2¼" diam. Made of heavy steel, zinc plated to prevent rust. Fits antenna masts up to 1¼" diam.

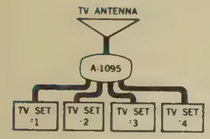
Cat. No. 32-018 **List $1.96**



WALL MOUNT

An economical way to mount antennas to walls where overhang or eave does not exceed 2½". Heavy steel, zinc plated. Will accept masts up to 1¾" diam.

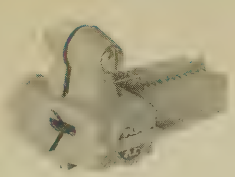
Cat. No. 32-002-1 **List $1.07**

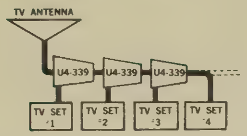


VHF 4-SET TV COUPLER

Operate up to 4 TV sets from 1 antenna. Prevents interference between sets, yet provides strongest possible reception to all. Attaches outside or inside (mounting accessories for mast and wall included).

32-187 **Net $3.44**



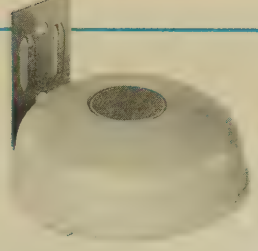


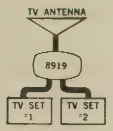
MULTI-SET VHF-UHF-FM COUPLER

For strong signal areas

Operate up to 10 TV or FM sets (or both) on 1 antenna. Coupler merely "slides on" lead-in wire (flat line); no cutting, stripping, splicing or soldering.

U4-339 **Net $2.69**

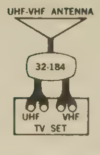




"LOW LOSS" 2-SET COUPLER

Operate 2 sets (TV & FM, or 2 TV, or 2 FM) from 1 antenna. Coupler mounts anywhere: wall, mast, indoors (mounting bracket included).

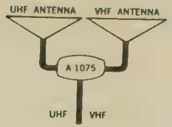
8919 **Net $2.40**



UHF-VHF TV SIGNAL SPLITTER

"Splits" the combined signal from antenna into separate channels. Connects single lead wire to both UHF and VHF terminals of set.

32-184 **List $2.97**

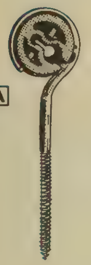


UHF-VHF TV SIGNAL "COMBINER"

Allows you to couple a UHF and VHF antenna together to a single lead in; or may be used as a splitter to separate UHF and VHF channels at set. Attaches anywhere: mast, wall, etc. (mounting accessories included).

32-183 **Net $2.55**

ANTENNA MOUNTING ACCESSORIES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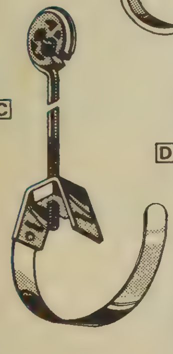
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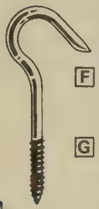
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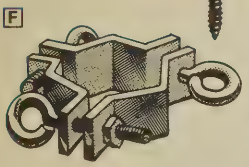
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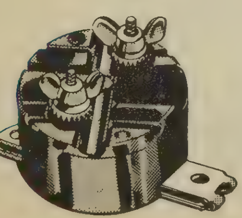
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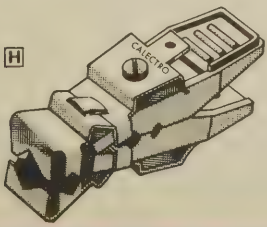

H

TV WIRE HOLDERS (Stand-offs)

A **TV WIRE HOLDERS**
Wood screw type, 3½″ long. Insulator fits "flat-line," foam & co-ax cable.

32-050	Pkg. of 4	**List $.42**

Same as above, but 7½″ long.

32-054	Pkg. of 3	**List $.71**

B **TV WIRE HOLDERS**
Snap-on type. Fits on 1¼″ masts. Universal insulation for all types of cable.

32-062	Pkg. of 2	**List $.58**

C **TV WIRE HOLDER**
Strap-on mast type. Fits masts up to 2¾″ diam. with 3½″ stand-off & universal plastic insulator.

32-048	Pkg. of 2	**List $.58**

D **SCREW EYES**
For fastening antenna guy wires to roofs and walls. 3″ long.

32-130	Pkg. of 4	**List $.89**

E **SCREW HOOKS**
Same as above but heavier, open ended and 4⅜″ long.

32-132	Pkg. of 4	**List $1.07**

GUY WIRE CLAMP

F For fastening guy wires to mast up to 2½″ diam.

32-026		**List $.87**

G **LIGHTNING ARRESTOR**
Use with flatline, oval or foam cable. Wire piercing washers and wing nuts for easy connection. Use with ground wire No. U4-353.

32-120		**List $1.31**

H **ANTENNA CLIP**
For quickly attaching and disconnecting antenna wire to back of set.

32-100	Pkg. of 2	**List $.84**

I **ANTENNA LEAD-IN WIRE (Flat line)**
High quality, weather resistant cable for normal in-city/suburban installations. Brown type, weather resistant.

U4-356	50 ft.	**Net $1.19**
U4-358	100 ft.	**Net $1.95**

Clear type, for inside use to blend with baseboards, walls & carpets.

U4-355	50 ft.	**Net $1.19**

J **ANTENNA "TWIN FOAM" CABLE**
Low loss cable for best reception of color & UHF. Plastic "armor" resists weather extremes. Guaranteed life of 10 years.

U4-362	50 ft.	**Net $2.69**
U4-364	100 ft.	**Net $4.45**

K **ANTENNA MAST GUY WIRE**
Stranded heavy galvanized steel wire.

32-114	50 ft.	**List $1.09**

L **ALUMINUM GROUND WIRE**
Heavy (⅛″) soft wire for grounding masts & connecting lightning arrestors.

U4-353	50 ft.	**Net $1.29**

M **ANTENNA WALL OUTLET SURFACE**
Surface mounting; attractive, small design complete with matching plug. Solderless connections. Ivory color.

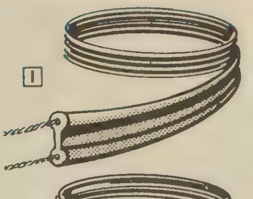
U4-332	One Set	**Net $.49**

N **ANTENNA WALL PLATE**
For single antenna. Complete with plug & hardware. No soldering. Mounts in std. electric outlet box. Ivory color.

U4-333	One Set	**Net $.65**

O **DUAL ANTENNA WALL PLATE**
For connecting two antennas. Comes with 2 plugs and hardware.

U4-334	One Set	**Net $1.20**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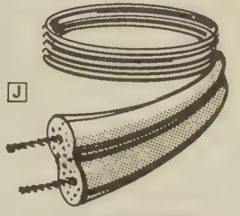
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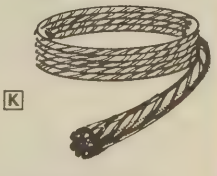
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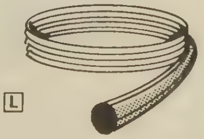
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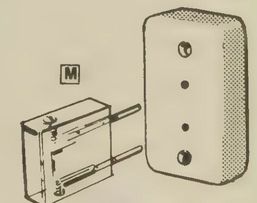
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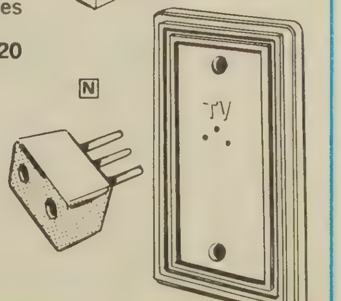
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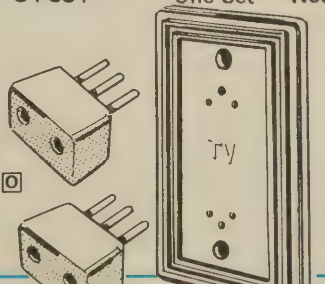
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SPEAKER WIRE SELECTION TABLE

To avoid excessive power loss when connecting extension speakers, the length of the wire and the impedance of the speaker must be considered. The maximum length shown below will result in negligible loss. If length is exceeded, power loss will be noticeable. In most cases, however, double the length as shown is tolerable.

Wire	SPEAKER IMPEDANCE		
Gauge	3-4 Ohm	8 Ohm	16 Ohm
18	40 ft.	80 ft.	160 ft.
20	25 ft.	50 ft.	100 ft.
24	10 ft.	20 ft.	40 ft.

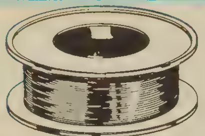
EXTENSION CORD TABLE

For safety's sake always select the right size cord. The table shows the recommended wire gauge and length for various horsepower and Amp ratings. The lengths indicated are the maximum length which should be used to provide no more than 5% voltage drop at 117 volt.

TYPE OF USE		All lengths are safe for both 2 and 3 conductor cords, except those with an asterisk, which are for 3 conductor			
HP of Motor (Single Phase)	Amps	#18 AWG	#16 AWG	#14 AWG	#12 AWG
¼	5.8	up to 74′	up to 118′	up to 188′	up to 300′
⅓	7.2	up to 60′	up to 95′	up to 152′	up to 241′
½	9.8	*up to 44′	up to 70′	up to 111′	up to 177′
¾	13.8	—	*up to 50′	up to 79′	up to 126′
1	16.0	—	—	*up to 68′	up to 108′
1½	20.0	—	—	—	*up to 87′

WIRE SPECIFICATION TABLE

GAUGE		DIAMETER		RESISTANCE
American (AWG)	Metric (Approx.)	Mils 1″/1000	MM	Ohms per 100 Ft.
16	14	51	1.3	0.41
18	10	40	1.0	0.66
20	8	32	0.8	1.0
22	7	25	0.6	1.7
24	5	20	0.5	2.7
26	4	16	0.4	4.2
28	3	13	0.3	6.7
30	2.5	10	0.25	10.7
32	1.8	8	0.2	17.1
34	1.6	6	0.16	27.1
36	1.2	5	0.13	43.1
38	1.0	4	0.1	68.6



MAGNET WIRE

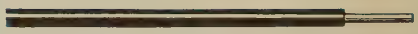
Insulated with two coats of enamel. Perfect for winding coils and transformers.

Cat. No.	Gauge	Length	Net
L3-610	20	40 ft.	$.50
L3-612	24	100 ft.	$.50
L3-614	28	200 ft.	$.65
L3-616	32	400 ft.	$.79

HOOK-UP WIRE; STRANDED — 20 GAUGE

Vinyl insulated, 600 volt rating. Flexible and easy to strip.

Cat. No.	Color	Length	Net
L3-624	Black	20 ft.	$.55
L3-625	Red	20 ft.	$.55
L3-626	Yellow	20 ft.	$.55



HOOK-UP WIRE: SOLID — 22 GAUGE

Vinyl insulated, 600 volt rating, easy to strip. The perfect wire for circuit building and experimental and hobby projects.

Cat. No.	Color	Length	Net
L3-632	Black	25 ft.	$.50
L3-633	Red	25 ft.	$.50
L3-634	Yellow	25 ft.	$.50

HOOK-UP WIRE — SHIELDED

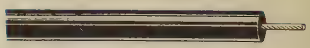
20 gauge stranded wire, vinyl insulated and with a tinned copper shield.

Cat. No. L3-641 10 ft. **$.95 Net**

PHONO PICK-UP WIRE

Thin, extra flexible cable. 2 conductor with light copper braid shield. For monaural or stereo.

Cat. No. L3-644 5 ft. **$.59 Net**

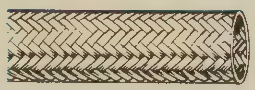


TEST LEAD WIRES

Ultra flexible, heavy rubber insulated wire.

50″ Each Black & Red

Cat. No. L3-646 **$.79 Net**



SHIELDING BRAID

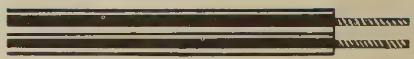
Slides over wires for shielding applications or may be used for bonding. Very flexible. Inside diam.: ⅛″. Flat diam.: approx. 1/16″ x 5/32″.

Cat. No. L3-648 5 ft. **$.59 Net**

SPEAKER WIRE

Special thin 2 conductor "Zip" cord for loudspeaker connection and many other low voltage application. Clear plastic insulation blends with all wall colors. Use table above to select proper gauge.

Cat. No.	Gauge	Length	Net
L3-650	24	25 ft.	$ .69
L3-701	24	60 ft.	$1.19
L3-705	20	50 ft.	$1.69



ELECTRICAL WIRE, 2 CONDUCTOR 18 GAUGE

"Zip" cord; UL type SPT-1; vinyl insulation. Standard cord as used for electrical appliances, extension cords, etc. Also as speaker wire where 18 gauge is required.

L3-707	25 ft.	Ivory	$1.29 Net
L3-708	25 ft.	Brown	$1.29 Net

INTERCOM WIRE

For intercoms, telephones, thermostats, signal or toy hook-ups. 22 gauge, vinyl insulation for indoor or outdoor use.

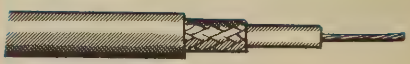
3 Conductor, Twisted; no Jacket, 35 ft.
L3-680 **$1.49 Net**

4 Conductor, With Outer Jacket, 25 ft.
L3-683 **$1.49 Net**

AUDIO CABLE

Shielded, single conductor wire, with grey vinyl jacket. Very flexible. Used for audio connecting and extension cords, and small microphones. Diam.: ⅛″.

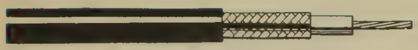
L3-657 12 ft. **$.98 Net**



MICROPHONE CABLES

Heavy duty, low loss, shielded cables with tough weather and abrasion resistant plastic outer jacket.

Cat. No.	No. of Conductors	Length	Net
L3-660	1	20 ft.	$1.49
L3-663	2	18 ft.	$1.49

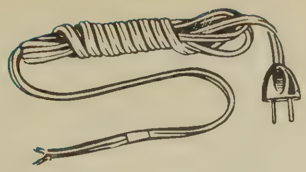


CO-AX CABLES

TYPE RG 58/U has an impedance of 52 Ohm and is used for CB and Ham Antenna connections and UHF measuring instrument cables.

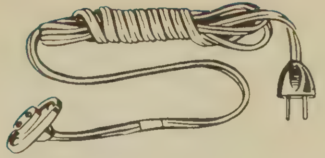
TYPE RG 59/U has an impedance of 72 Ohm and is used to connect TV sets to master antenna systems, etc.

L3-668	20 ft.—RG 58/U	**$1.49 Net**
L3-670	20 ft.—RG 59/U	**$1.49 Net**



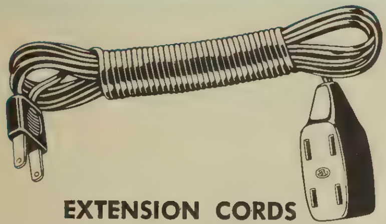
AC REPLACEMENT CORD

For radios, TV's, lamps, clocks, and small appliances; 6 ft. long.
Cat. No. L3-717 Brown **$.47 Net**



TV "CHEATER" CORD

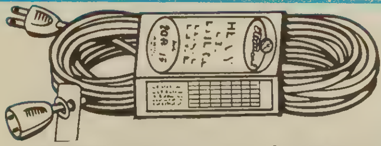
Cord with special interlock connector as used on most TV sets; 6 ft. long.
Cat. No. L3-720 Brown **$.55 Net**



EXTENSION CORDS

All vinyl with molded-on unbreakable plugs and outlets; 9 ft. long.

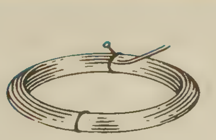
Cat. No. L3-725	Brown	**$.75 Net**
Cat. No. L3-726	Ivory	**$.75 Net**



EXTENSION CORDS, INDOOR-OUTDOOR, HEAVY DUTY

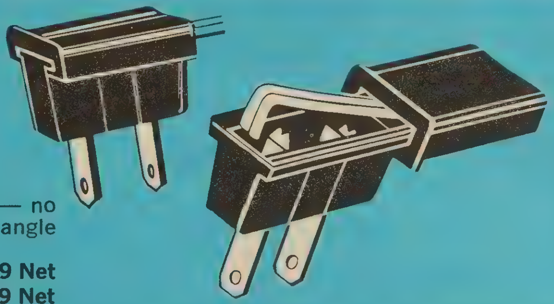
Lifetime cords for use with power and garden tools, portable lighting, etc.; bright yellow; 25 ft. long.

L3-735	2 Conductor	**$2.98 Net**
L3-737	3 Cond. (Grounding)	**$4.25 Net**



ANTENNA WIRE

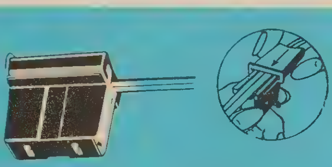
Stranded 16 gauge copper wire, not insulated. The standard wire for outside antennas.
Cat. No. L3-695 50 ft. **$1.25 Net**



ELECTRICAL PLUG

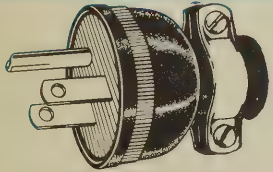
Instant assembly, no tools — no stripping of wire. Right angle type.

L3-746	Brown-Pkg. of 2	**$.39 Net**
L3-747	Ivory-Pkg. of 2	**$.39 Net**



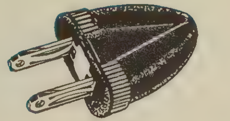
FEMALE CONNECTOR

Attach at end or anywhere along the cord for an additional outlet. No tools, cutting or stripping. Pkg. contains one each Brown and Ivory.
L3-755 Pkg. of 2 **$.45 Net**



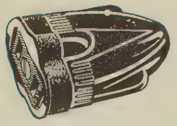
GROUNDING PLUG

Sturdy rubber handle "U" Ground Plug. Accommodates wires to 7/16" diam. Includes cable clamp.
L3-759 Pkg. of one **$.95 Net**



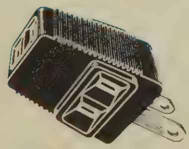
ELECTRICAL PLUG

Heavy duty type. Fits cords to 5/16" diam. Lifetime vinyl handle. Easy to attach.
L3-748 Black-Pkg. of 2 **$.59 Net**



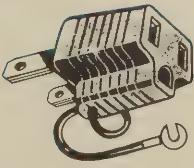
FEMALE CONNECTOR

Heavy duty type. Fits cords to 5/16" diam. Vinyl plastic. Matches plug No. L3-748.
L3-757 Pkg of one **$.48 Net**



3 OUTLET PLUG

Also known as "Cube Tap." Permits 3 cords to be plugged into a single outlet.
L3-765 Pkg. of one **$.39 Net**



GROUNDING ADAPTOR

Permits "U" ground 3 prong plugs to be plugged into the regular, older style 2 prong outlets.
L3-749 Pkg. of one **$.35 Net**

TWIST-ON WIRE CONNECTORS

Solderless connectors, safe for all electrical wire splicing. Assortment of small and medium sizes for household and electronic wiring.
L3-768 Pkg. of 12 **$.25 Net**

MULTITESTERS — WHAT THEY ARE AND WHEN TO USE 'EM!

Multitesters are the universal electronic test instrument used by all engineers and technicians, as well as by serious hobbyists. They measure voltage, resistance, and current. Some also measure decibels and capacitance.

If you're really interested in electronics, you should consider a multitester among your first investments in the hobby. You'll use it to check out circuits, to test components, and to find your wiring mistakes. You'll find this versatile instrument useful elsewhere, too — as in testing and/or repairing electrical appliances, toys, batteries, etc., or for troubleshooting the electrical system in your car, boat or home.

We have selected Calectro Multitesters on the basis of their ruggedness, accuracy and dependability. They're the Best Buys in the industry and covered by one of its finest guarantees. Each comes complete with batteries, test leads, and instructions. You'll be proud to own a Calectro Multitester!

ALL CALECTRO MULTITESTERS ARE PROTECTED AGAINST OVERLOAD OR BURN-OUT BY NEW, SOLID STATE CIRCUITRY

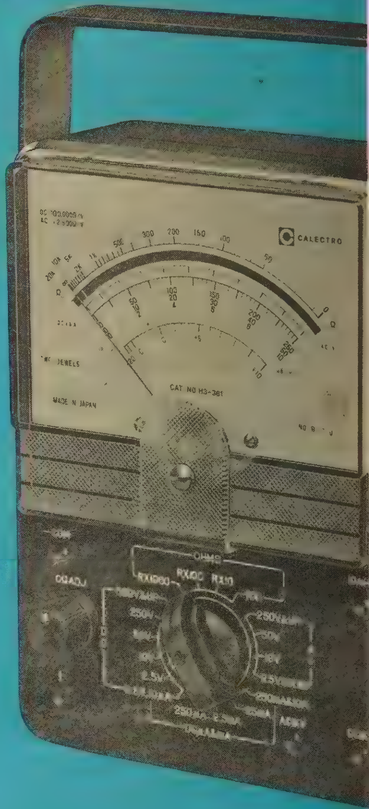
PRECISION MULTI-TESTER —29 RANGES

One of the most attractive and versatile test instruments available. Superb styling is combined with great accuracy and rugged, printed circuit construction. The large mirrored scale, the jeweled movement, and the use of precision temperature compensating 1% resistors give this tester near "laboratory standard" accuracy. Case is molded of hi-impact, light weight plastic in modern charcoal black color. ± 3% accuracy DC volts, ± 5% accuracy AC volts.

SPECIFICATIONS

Sensitivity:	20,000 ohm/volt AC and DC
DC Volt:	1—2.5—5—10—25—50—100—250—500—1,000
AC Volt:	1—2.5—5—10—25—50—100—250—500—1,000
DC Current:	50 μA — 2.5 mA — 25 mA — 500 mA
Ohm:	5 k — 50 k — 500 k — 5 MEG
Decibel:	—20 to +22
Size:	4″ high — 7¼″ wide — 1¾″ deep

Cat. No. H3-358 **$22.95 Net**



ULTRA SENSITIVE, LAB TYPE

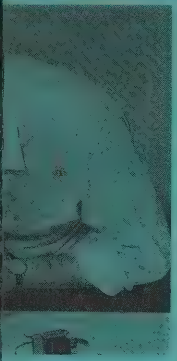
100,000 ohm/volt. 20

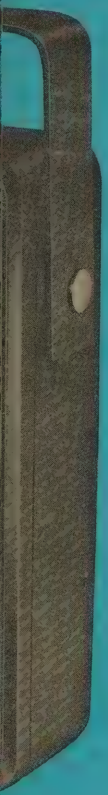
A precision instrument designed for
still within the price range of technic
electronic hobbyists. Large two-color
accurate reading. High internal re
critical voltages without "loading" t
ed ohm scales read from fraction
megohm. Housed in an attractive a
case with carrying handle. ± 2% mete

SPECIFICATIONS

Sensitivity:	100,000 ohm/volt D 12,500 ohm AC
DC Volt:	0.5—2.5—10—50 1,000
AC Volt:	2.5—10—50—250
DC Current:	10 μA — 250 μA — 250 mA — 10 am
Ohm:	2 K — 200 K — 2
Decibel:	—20 to +62 (6 ra
Size:	7¼″ high — 6″ wi

Cat. No. H3-361





ULTI-TESTER

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50—500—

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5 mA — 25 mA

G — 20 MEG
es)
— 2¾″ deep.
$37.50 Net

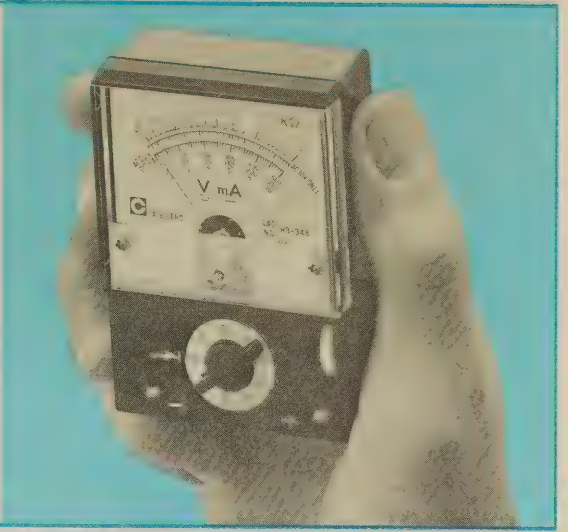
HANDY POCKET TESTER — 9 RANGES

One of the finest small multi-testers at any price. An ideal instrument for the technician to carry with him, but equally useful for the budget minded experimenter and hobbyist. With carrying case, range selector switch, zero adjustment for needle. Built-in magnet holds meter securely to metal work-bench, chassis, electrical appliance, automobile fender, etc. Only 3¼″ x 2⅜″ x 1¼″

SPECIFICATIONS

Sensitivity:	1,000 ohm/volt AC/DC
DC Volt:	10—50—250—1,000
AC Volt:	10—250—500
DC Current:	250 mA
Ohm:	100 K (3 K at center scale)

Cat. No. H3-348 **$8.95 Net**



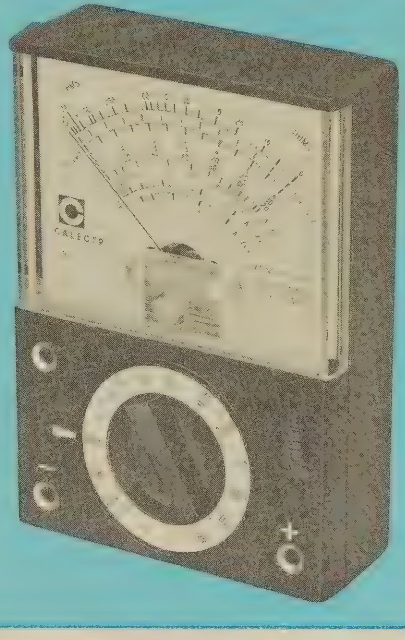
16 RANGE MULTI-TESTER

Small, universal instrument in modern rectangular styling. Jeweled movement. Easy to read 2-color dial. An all-around tester, equally useful for portable or bench use by technicians, experimenters, in schools, etc.

SPECIFICATIONS

Sensitivity:	20,000 ohm/V DC — 10,000 ohm/V AC
DC Volt:	0.3—3—12—60—120—600
AC Volt:	12—60—120—600
DC Current:	60 µA — 3 mA — 300 mA
Ohm:	5 K — 500 K — 5 MEG
Decibels:	—20 to +37 (2 ranges)
Capacitance:	250 pF to 0.02 µF
Size:	4¾″ high—3⅜″ wide—1½″ deep

Cat. No. H3-352 **$13.95 Net**



19 RANGE MULTI-TESTER

A precision instrument with 30,000 ohm per volt sensitivity. Rugged, easy to use and read, this is an ideal meter for the lab, the technician, and the serious hobbyist. Two color scale for easy readability. Hand calibration and 1% precision resistors assure excellent accuracy.

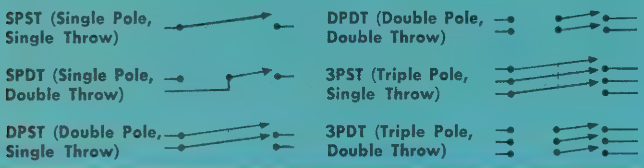
SPECIFICATIONS

Sensitivity:	30 K ohm/volt DC — 15 K AC
DC Volt:	3—12—60—300—600—1,200
AC Volt:	6—30—120—600—1,200
DC Current:	30 µA — 3 mA — 30 — 300 mA
Ohm:	16 K — 160 K — 1.6 MEG — 16 MEG
Decibels:	—20 to +63 (5 ranges)
Size:	5½″ high—3½″ wide—1⅜″ deep

Cat. No. H3-355 **$17.95 Net**

SWITCHES — HOW TO PICK THE ONE YOU NEED!

Abbreviations describe the number of contacts (poles) a switch has, as well as its switching mode. A SPST switch, for example, is a **single pole single throw type** — meaning it has one movable and one fixed contact. An SPDT switch, on the other hand, has one movable and two fixed contact positions, with the movable contact capable of going back and forth between the two fixed positions. Here are the most-used abbreviations:

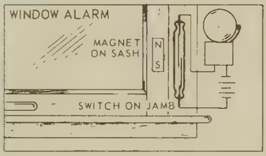


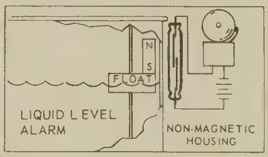
SPST (Single Pole, Single Throw)
SPDT (Single Pole, Double Throw)
DPST (Double Pole, Single Throw)
DPDT (Double Pole, Double Throw)
3PST (Triple Pole, Single Throw)
3PDT (Triple Pole, Double Throw)

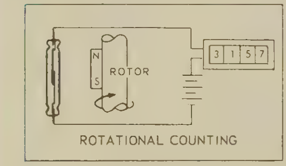
Momentary contact switches operate only while they're being pushed or pressed — like the one on your door bell. If a momentary contact switch is a double throw type, one contact is normally open (N.O.), the other normally closed (N.C.) You may usually substitute a more complex switch for a simpler type, if you like. An SPDT switch can replace an SPST, for example, by simply ignoring one contact position. Heavy duty switches, in contrast to lower-priced light duty types, are designed for greater reliability and repeated use. Both types may have similar maximum ratings, with the latter designed for occasional applications, low voltage equipment, etc. "UL (Underwriters Lab) listed" indicates that the device has been tested and approved for safe use within the stated rating.

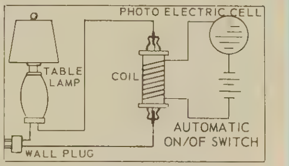
THE AMAZING REED SWITCH

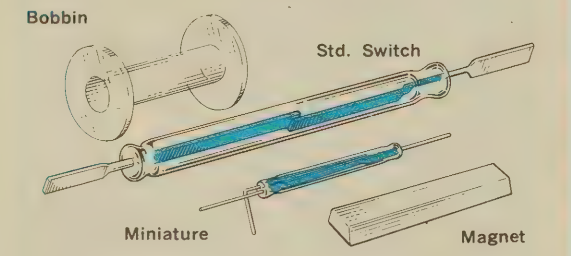
Operates by proximity of a magnet — nothing to touch. Hermetically sealed, completely moisture and dust-proof. Used for dozens of hobby and industrial applications such as burglar alarms; toys; limit, light and temperature controls; counters; position indicators, etc. When used with a permanent magnet, a reed switch operates as a mechanical switch. With a coil, it becomes a sensitive relay.


WINDOW ALARM


LIQUID LEVEL ALARM


ROTATIONAL COUNTING


AUTOMATIC ON/OF SWITCH



Switches shown approx. actual size

HOBBYIST REED SWITCH KIT

Consists of standard size switch and Alnico magnet. Switch is rated @ 1 amp up to 150V AC/100V DC, but not to exceed 12W Max.

Cat. No. E2-102 **$ .99 Net**

PRECISION REED SWITCH KIT

Consists of standard size switch, Alnico magnet and nylon bobbin for winding relay coil. Switch is rated @ 1½ A up to 150V DC/250V AC, but not to exceed 25W Max. Sensitivity: 40-60 AT; Activaing Time: 2½ millisecond. Life expectancy: several million cycles.

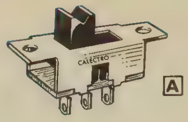
Cat. No. E2-095 **$1.49 Net**

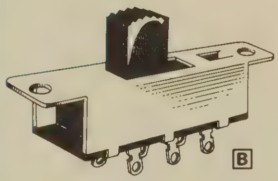
MINIATURE SPDT REED SWITCH KIT

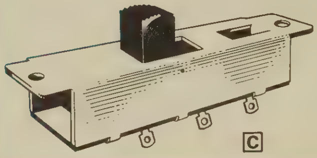
Miniature SPDT switch with magnet and bobbin. Rating ½ amp up to 100V AC/DC, but not to exceed 10W Max.

Cat. No. E2-100 **$1.95 Net**

SLIDE SWITCHES







A SUB-MINIATURE SLIDE SWITCHES

World's tiniest slide switches. Suitable for all miniaturized equipment. Rated at ½ amp —50 volt.

SPDT TYPE. 7/16" wide x 9/16" mounting ctrs. **Cat. No. E2-104** **$ .34 Net**

DPDT TYPE. 9/32" wide x ¾" mounting ctrs. **Cat. No. E2-105** **$ .49 Net**

B STANDARD SLIDE SWITCHES

UL listed. For electrical, electronic and automotive uses. Rated at 3 amp - 125 volt AC. Size: 17/32" wide x 1⅛" mounting ctrs.

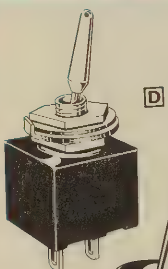
Cat. No. E2-110	SPST	**$.19 Net**
Cat. No. E2-111	SPDT	**.24 Net**
Cat. No. E2-114	DPDT	**.29 Net**

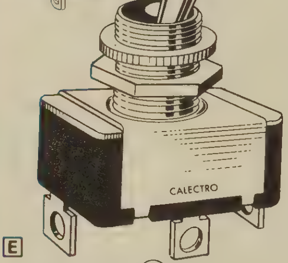
C SPRING RETURN SLIDE SWITCH

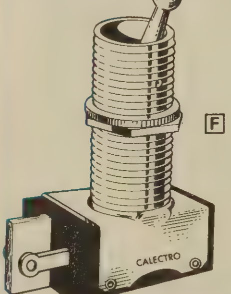
For use on intercoms, etc. UL listed and rated at 6 amp - 125 volt AC. Size: 17/32" wide x 1 - 5/16" mounting ctrs.

Cat. No. E2-115 DPDT **$.49 Net**

TOGGLE SWITCHES







D MINIATURE TOGGLE SWITCHES

Less than half the size of standard toggle switches. Real space savers. Rated at 125 volt AC. ¼" mounting hole.

Cat. No. E2-116	SPST-3A	**$1.39 Net**
Cat. No. E2-118	DPDT-6A	**$1.69 Net**

E STANDARD TOGGLE SWITCHES

Positive snap action, long-life; complete with two mounting nuts to fit panels up to 7/16" thick. 15/32" mounting hole.

SPST—6A/125V AC. UL listed.
Cat. No. E2-120 **$.89 Net**

SPDT—6A/125V AC. UL listed.
Cat. No. E2-121 **$.92 Net**

DPDT—6A/125V AC. UL listed.
Cat. No. E2-123 **$1.49 Net**

DPDT Center Off.—6A/125V AC.
Cat. No. E2-124 **$1.59 Net**

SPST—3 amp - Light Duty
Cat. No. E2-130 **$ .59 Net**

DPDT—3 amp - Light Duty
Cat. No. E2-133 **$ .69 Net**

F LONG SHANK TOGGLE SWITCHES

Same as above, but with 1" long shank for mounting in wooden cabinets.

SPST—6A/125V AC. UL listed.
Cat. No. E2-126 **$1.29 Net**

DPDT—3A/125V AC. UL listed.
Cat. No. E2-128 **$1.95 Net**

G TOGGLE SWITCH ON/OFF PLATE

Nickel plated. Fits all standard toggle switches.

Cat. No. E2-137 Pkg. of 3 **$ .19 Net**

PUSH BUTTON SWITCHES

MINIATURE SWITCHES: Ideal for all electronic or electrical equipment requiring reliable, extra small switches. Rated at 100V-1 amp.

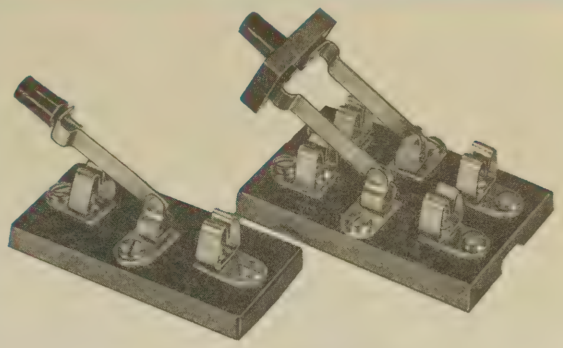
A **MOMENTARY CONTACT, SPST;** normally off; Overall length: 1-3/32"; Diam.: 11/32"; Bushing: 9/32" diam., 1/4" long.
Cat. No. E2-140 **$.59 Net**

B **MOMENTARY CONTACT, SPDT;** for circuits requiring "transfer" or "normally closed" style. Overall length: 11/16"; Diam.: 5/8"; Bushing: 1/4" diam., 1/8" long.
Cat. No. E2-141 **$.54 Net**

STANDARD SWITCHES: Compact, attractive and space saving, rated at 250V AC-3 Amp. Overall length: 1-13/32"; Diam.: 15/32"; Bushing: 15/32" diam., 13/32" long.

C **MOMENTARY CONTACT SPST;** normally off red plastic button.
Cat. No. E2-142 **$.74 Net**

C **PUSH-ON/PUSH-OFF, SPST;** white plastic button.
Cat. No. E2-144 **$.89 Net**



KNIFE SWITCHES

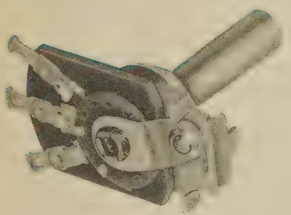
Used for switching antennas, batteries, and other low voltage applications. Low loss, high dielectric insulating base and handle. Plated brass contacts. Screw connections.

Cat. No. E2-150 **$.27 Net**
Single Pole/2 Position

Cat. No. E2-151 **$.34 Net**
Double Pole/2 Position

ROTARY SWITCHES

A



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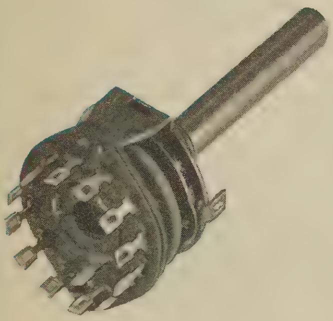

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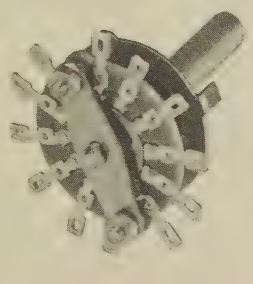


Extremely compact design. Highest quality construction for long life; silver plated contacts; Bushings: ⅜-32 x 3/16" long; ¼" Diam. Brass Shaft, min. 1" length. Positive indexing and stops. Calectro standardized switches make possible numerous configurations with a few basic types. The number of positions required determines selection. Example: 2 pole—3 position switch is required. Use switch No.E2-165(3 pole—3 position) or No.E2-168(4 pole—3 position). Connect only the 2 sections required. Leave remaining terminals unconnected.

SHORTING AND NON-SHORTING TYPES: A shorting switch is one in which the next contact is made before contact is broken. Such switches are also called "make before break" types, and are used in switching loads such as loudspeakers, where the source cannot be safely operated without a load.

A non-shorting switch is one in which the contact position is opened before the next contact is made. Such switches are called "break before make" types and are used for band switching coils, in selecting multiplier resistors in multi-testers, etc.

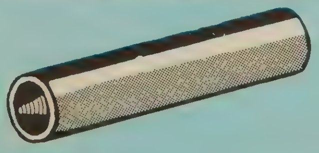
If type is not specified, either style may ordinarily be used.

Fig.	Cat. No.	Number Posit.	Poles	Type*	Rating	Diam. (Inch)	Net
A	**E2-159**	2	1	S.	1A-100V	1⅜	**$.69**
B	**E2-160**	2	2	N.S.	1A-100V	1½	**.89**
C	**E2-161**	11	1	N.S.	½A-100V	1¼	**.96**
D	**E2-162**	12	1	S.	½A-100V	1¼	**.96**
C	**E2-163**	5	2	N.S.	½A-100V	1¼	**.96**
D	**E2-164**	6	2	S.	½A-100V	1¼	**.96**
C	**E2-165**	3	3	N.S.	½A-100V	1¼	**.96**
D	**E2-166**	4	3	S.	½A-100V	1¼	**.96**
C	**E2-167**	2	4	N.S.	½A-100V	1¼	**.96**
D	**E2-168**	3	4	S.	½A-100V	1¼	**.96**
D	**E2-169**	2	6	S.	½A-100V	1¼	**.96**

* S = Shorting — NS = Non-shorting.

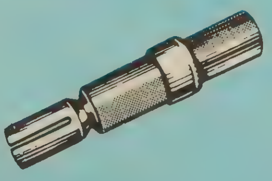
AUTO RADIO NOISE SUPPRESSORS

Eliminate "static" created by spark plugs and distributor. Very effective on standard AM car radios, and helpful in improving reception on FM, Ham, and CB equipment. For best results, use one distributor suppressor and 4 to 8 spark plug suppressors, depending on number of cylinders.



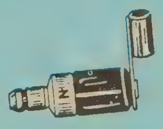
UNIVERSAL SPLICE-IN TYPE

For use on distributor or spark plugs where snap-in types will not fit due to limited space.
E2-514 **48c Net**



DISTRIBUTOR TYPE

Snap-in type. Fits on top of distributor.
E2-510 **39c Net**



SPARK PLUG TYPE

Snaps on top of spark plug. One required for each plug.
E2-512 **79c Net**
Pkg. of 2

A

B

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D

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G

H

I

All Lamps Shown Actual Size

MINIATURE and ULTRA MINIATURE LAMPS

Fig.	Cat. No.	Type	Volt	Amp	Quant. P/Pka.	Net/ Pkg.
A	**E2-430**	PR2	2.5	.50	2	$ .29
A	**E2-431**	PR3	3.6	.50	2	.29
B	**E2-435**	12	6.3	.15	1	.39
C	**E2-437**	40	6.3	.15	2	.29
D	**E2-439**	44	6.3	.25	2	.29
C	**E2-441**	46	6.3	.25	2	.29
D	**E2-442**	47	6.3	.15	2	.29
D	**E2-444**	49	2	.06	2	.39
E	**E2-446**	51	6	.22	2	.29
E	**E2-448**	53	12	.12	2	.29
F	**E2-451**	222	2.5	.25	2	.29
G	**E2-457**	1767	2.5	.20	2	.45
G	**E2-458**	1768	6	.20	2	.45
D	**E2-465**	1892	12	.12	2	.45
H	**E2-474**	∫ "Grain of	1.5-3	*	1	.34
H	**E2-475**	⌊ Wheat"	6-12	**	1	.34
I	**E2-480**	NE2	115†	.0005	2	.29
D	**E2-483**	NE51	115†	.0005	1	.45

* 70 mA to 110 mA depending on voltage.
** 50 mA to 80 mA depending on voltage.
† With 50K to 200K ohm resistor in series.

INTERCHANGEABILITY CHART

Use this table to find replacement for discontinued or hard-to-get lamp types.

Lamp No.	Substitute (See Note) Lamp No.	Substitute (See Note) Calectro Pkg. No.
39	44 47 51*	E2-439 E2-442 E2-446
55	44* 47* 51*	E2-439 E2-442 E2-446
57	53* 1892*	E2-448 E2-465
239	44 47 51*	E2-439 E2-442 E2-446
363	53 1892*	E2-448 E2-465
755	44 47 51*	E2-439 E2-442 E2-456
1488	53 1892	E2-448 E2-465
1813	53* 1892	E2-448 E2-465
1815	53* 1892	E2-448 E2-465
1816	53* 1892	E2-448 E2-465
1847	44 47 51*	E2-439 E2-442 E2-446
1891	53* 1892	E2-448 E2-465
1893	53* 1892	E2-448 E2-465
1895	53* 1892	E2-448 E2-465
NE-2E	NE-2	E2-480
NE-2H	NE-2	E2-480
NE-51H	NE-51	E2-483

Note: The CALECTRO lamps listed as substitutes have the same base/socket and voltage ratings. **In most cases** they may be used as a general purpose replacement provided space permits and the original lamp is wired in **parallel** with the power source. Since current ratings may vary, only exact duplicate replacements should be used if the original lamp is wired in **series** with tube filaments or other components. Where indicated by an asterisk (*) bulb shapes, size and color may vary.

PILOT LIGHT SOCKETS AND ASSEMBLIES

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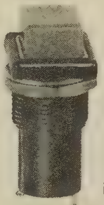

P

Q

R

S

M N Sockets with universal brackets that can be bent into many shapes for any application.

No. E2-400	Min. Screw Base (For Lamps C & F)	**$.29 Net**
No. E2-401	Min. Bayonet Base (For Lamps D & E)	**.29 Net**
No. E2-402	For 115V Candelabra Base Lamps	**.29 Net**

O Jewel faceted indicator lamp assembly. Mounts in 7/16" hole. Jewel is set in attractive polished chrome rim. Adjusts for any type of lamp used.

No. E2-405	Min. Bayonet Base (For Lamps D & E) with red lens	**$ 69 Net**
No. E2-406	Same but with green lens	**69 Net**

P Modern square style with translucent plastic lens. Lamp replaceable from front. 11/16" mounting hole. Fits panels to 7/16" thickness.

No. E2-407	Min. Screw Base (For Lamps C & F) with red lens	**$ 89 Net**
No. E2-408	Same but with green lens	**89 Net**

Q Attractive indicator light assembly with dome shaped plastic lenses for maximum visibility. Includes one each red, green, and white lens. Lamps replaceable from front. ⅝" mounting hole. Max. panel thickness: 5/32".

No. E2-410 Min. Bayonet Base (For Lamps D) **$.89 Net**

R Miniature assembly for use where space is limited. Supplied with both red and green lens and Type 1768-6Volt lamp, replaceable from front. Mounts in ⅜" hole. Fits panels to ⅜" thickness.

No. E2-412 Midget Screw Base (For Lamps "G") **$.65 Net**

S Neon lamp assembly for use on 110-125 volt AC or DC. Incorporates special bright lamp for excellent visibility. With one each red and clear lens.

No. E2-420 Neon Lamp Assembly **$.98 Net**

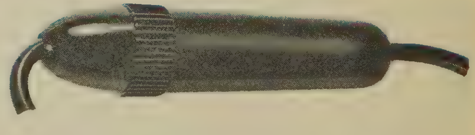
FUSE HOLDERS

Clip type for all standard ¼" x 1¼" fuses. Plated spring brass clips. Plastic insulated base.

Cat. No. E2-497 **$.34 Net**

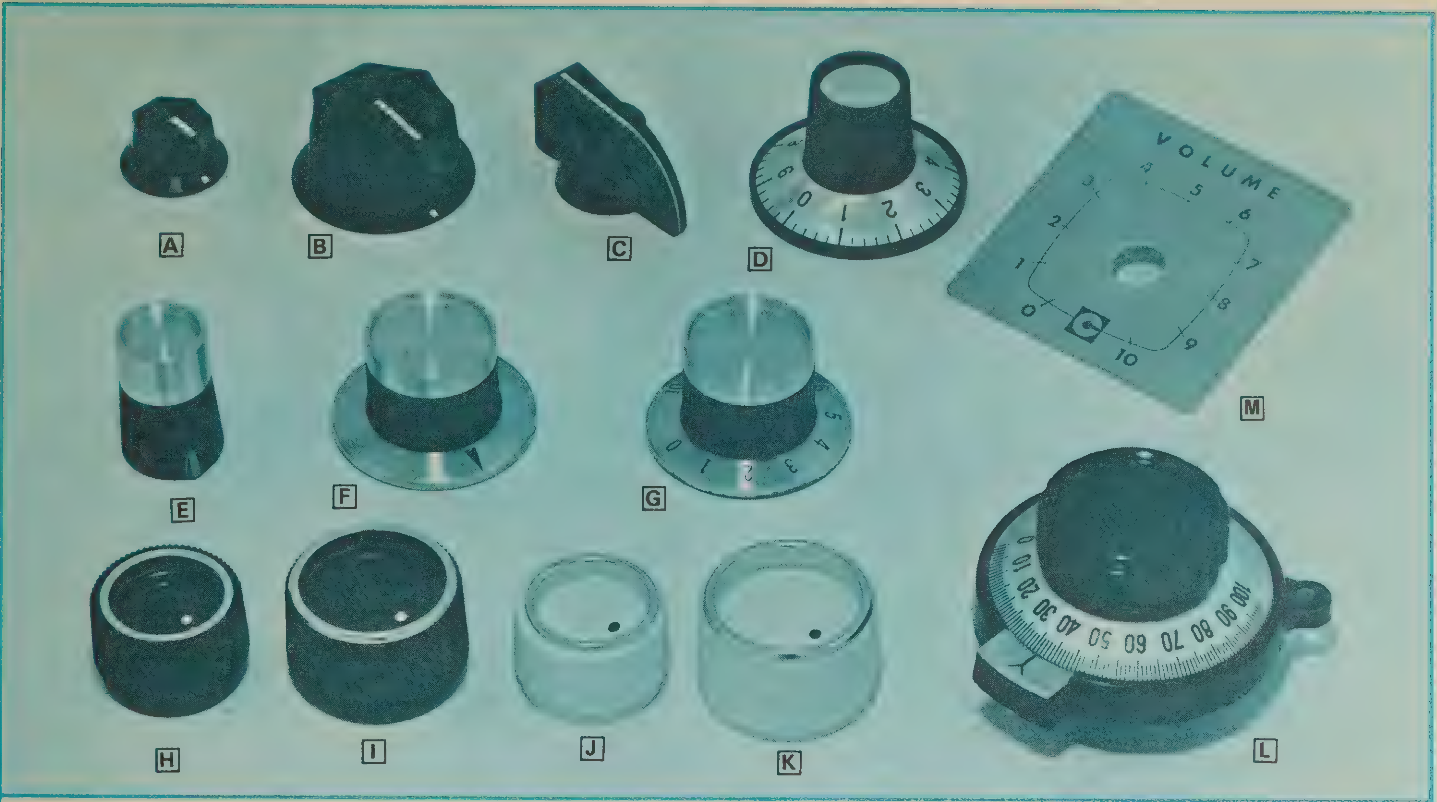
Panel mounted (front loading) bayonet type. Fits panels up to 5/16" thick. ½" diam. mounting hole. Fits all ¼" x 1¼" fuses.

Cat. No. E2-495 **$.69 Net**



In-Line Holder for all standard ¼" diam. fuses. Complete with lead wires and 3 springs to accommodate all automotive and electrical fuses from ⅝" to 1¼" long.

Cat. No. E2-499 **$.59 Net**



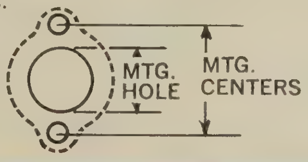
DELUXE QUALITY KNOBS AND DIALS

Calectro Knobs are beautifully styled and molded of finest thermo-setting plastic. All have brass insert for ¼″ shafts and set screw. Insert is insulated from any metal trim to prevent possible shock if used on "hot" chassis.

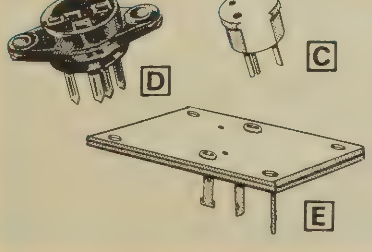
FIG.	TYPE	COLOR	DIAM. OR LENGTH	HEIGHT	CAT. NO.	NET EACH
A	Instrum. & Gnl. Purpose	Blk	3/4	7/16	E2-705	$ .34
B	Instrum. & Gnl. Purpose	Blk	1-3/8	11/16	E2-707	.49
C	Pointer	Blk	1-7/16	5/8	E2-710	.39
D	Calibrated; 0-9	Blk	1-9/16	1″	E2-715	.69
E	Hi-Style, Silver Trim	Blk	11/16	1-1/8	E2-716	.69
F	Hi-Style, Silver Trim	Blk	1-7/16	7/8	E2-717	.95
G	Calibrated; 0-10	Blk	1-7/16	7/8	E2-718	.95
H	Audio-Hi Fi	Ivory	1″	11/16	E2-720	.34
I	Audio-Hi Fi	Ivory	1-3/16	13/16	E2-721	.39
J	Audio-Hi Fi	Blk	1″	11/16	E2-724	.34
K	Audio-Hi Fi	Blk	1-3/16	13/16	E2-725	.39
L	Calibrated dial plate; gold etched with numbers 1 thru 10				E2-750	.49
L	Same as above, but with "Volume" heading				E2-751	.49
M	Vernier dial for precision tuning; mounts on front panel; 8 to 1 turn ratio. Diam. 1½″				E2-744	1.49
M	Same as above, but 2″ Diam.				E2-745	1.75

TUBE SOCKETS

Calectro Tube Sockets are of the saddle type and designed for bottom mounting. Three chassis holes are required. Sockets are fastened with No. 2 or No. 4 screws and nuts.



DESCRIPTION	MTG. HOLE	MT. CENTERS	CAT. NO.	QUANT. PER PKG.	NET/PKG.
7 Pin, Standard	5/8	7/8	F2-960	2	$.35
9 Pin, Standard	3/4	1-1/8	F2-962	2	.39
Octal (8 Pin)	1-1/8	1-1/2	F2-964	2	.39
Nuvistor	1/2	3/4	F2-966	1	.39
Novar (9 Pin)	1-1/8	1-1/2	F2-967	1	.29
Compactron (12 Pin)	1-1/16	1-5/16	F2-969	1	.39

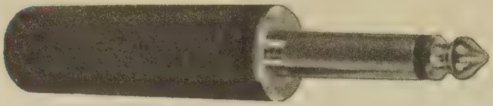


TRANSISTOR SOCKETS

The use of Transistor Sockets is recommended for all experimental circuits as well as hobby and science projects. They make it possible to change transistors easily and avoid the risk of damaging them when soldering.

FIG.	DESCRIPTION	CAT. NO.	QUANT. PER PKG.	NET PKG.
C	Printed circuit type for miniat. Transis.	F2-980	2	.49
C	Printed circuit type for std. TO-5 base	F2-982	2	.49
D	Universal	F2-984	2	.49
E	TO-3 Power	F2-990	1	.35
E	TO-66 Power	F2-992	1	.35

A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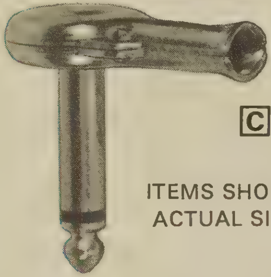
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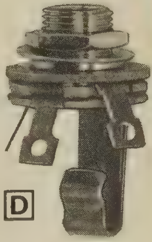
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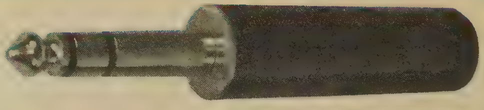
ITEMS SHOWN ACTUAL SIZE

STEREO ENTHUSIASTS NOTE:

See Stereo Headphone Junction Box (Cat. No. Q4-226) Page 6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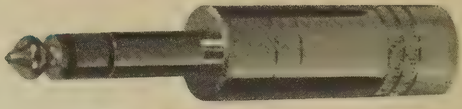
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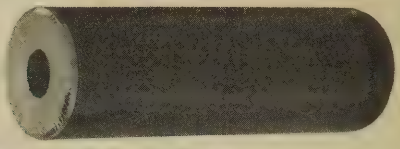
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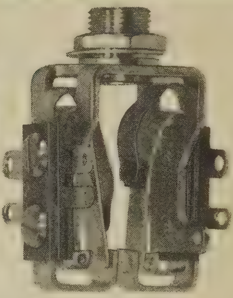
I

ITEMS SHOWN ACTUAL SIZE

STANDARD ¼" - 2 CONDUCTOR PHONE PLUGS AND JACKS

Fig.	Cat. No.	Description	Net
A	**F2-815**	Plug, shielded (metal) handle, solder lug/clamp	$.59
B	**F2-816**	Plug, black plastic handle, solder lug/clamp	.43
B	**F2-817**	Plug, red plastic handle, solder lug/clamp	.43
B	**F2-818**	Plug, black plastic handle, screw terminals	.48
C	**F2-819**	Plug, right angle, metal handle, solder type	.48
D	**F2-837**	Jack, chassis (panel) mounting, universal (open, closed style)	.43
E	**F2-838**	Jack, cord mounting (in-line); plastic handle	.50

STANDARD 3 CONDUCTOR (STEREO) PHONE PLUGS AND JACKS

Fig.	Cat. No.	Description	Net
G	**F2-830**	Plug, black plastic handle, solder lug/clamp	$ .65
H	**F2-832**	Plug, shielded (metal) handle, solder lug/clamp	89
I	**F2-847**	Jack, chassis mounting; universal use in any circuit; switches 2 isolated circuits in a DPDT fashion; for use with 2 or 3 conductor plugs	.85
J	**F2-848**	Jack, chassis mounting; open circuit	.55
K	**F2-849**	Jack, cord mounting (in-line); plastic handle	.98

N

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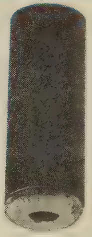
P


Q

MINIATURE - 3½mm - PHONE PLUGS AND JACKS

Fig.	Cat. No.	Description	Net
N	**F2-820**	Plug, shielded (metal) handle, solder lugs	$.43
O	**F2-821**	Plug, plastic handle, solder lugs	.34
P	**F2-842**	Jack, chassis mount.; open or closed circuit	.29
Q	**F2-843**	Jack, cord mount.; (in-line) plastic handle	.49

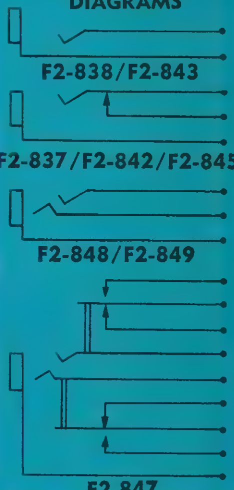
T

U

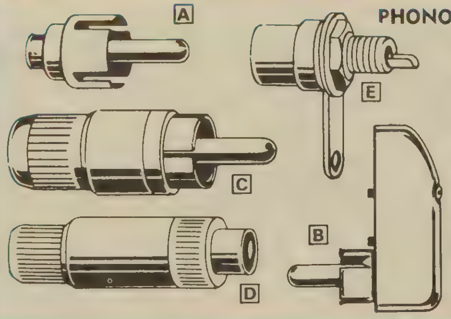
SUB-MINIATURE - 2½mm - PHONE PLUGS AND JACKS

Fig.	Cat. No.	Description	Net
T	**F2-826**	Plug, plastic handle, solder lugs	$.34
U	**F2-845**	Jack, chassis mount.; open or closed circuit	.29

JACK SCHEMATIC DIAGRAMS



PHONO PIN PLUGS AND JACKS (RCA TYPE)



A Standard small plug, solder type.
No. F2-800 Pkg. of 3$.29 Net/Pkg.

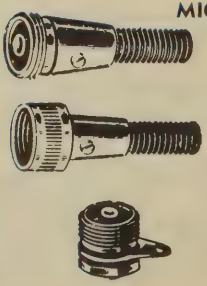
B Solderless, right angle plug. Black and red plastic handles.
No. F2-801 Pkg. of 2 **$.74 Net/Pr.**

C Shielded (metal handle) plug. Easy to solder.
No. F2-802 Pkg. of 2 **$.59 Net/Pkg.**

D Jack; cord mounting; shielded handle. Easy to solder.
No. F2-807 Pkg. of 2 **$.59 Net/Pkg.**

E Jack; single hole chassis mounting.
No. F2-806 Pkg. of 2 **$.59 Net/Pkg.**

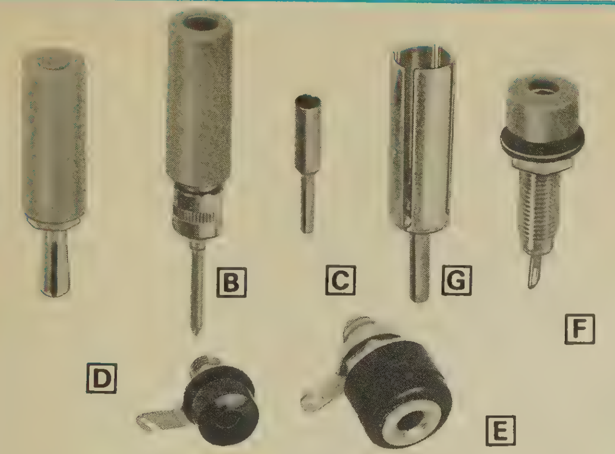
MICROPHONE CONNECTORS



Male connector, single contact type.
Cat. No. F3-110 45 Net

Female connector, single contact type.
Cat. No. F3-111 $.49 Net

Panel (chassis) mounting connector. Supplied with insulating washers.
Cat. No. F3-112 .37 Net



PLUGS AND JACKS

A Banana Plugs; with internal stud for solderless or solder connection.
No. F2-860 One each black and red **$.49 Net/pr.**

B Test Tip Plugs; heavy duty; solderless connection.
No. F2-866 One each black and red **$.42 Net/pr.**

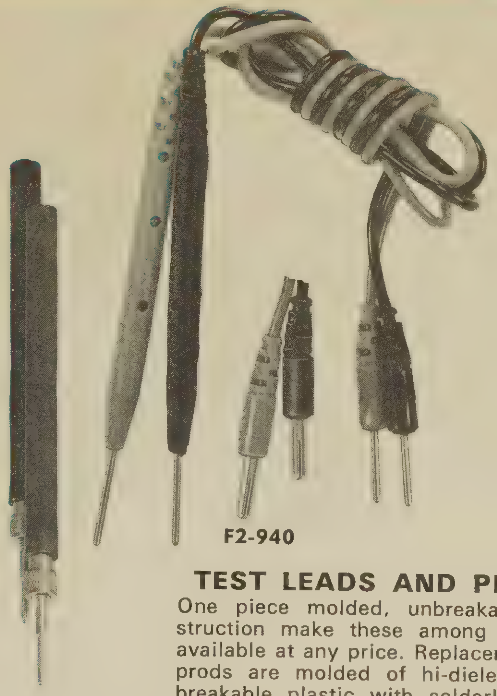
C Phone Tips; solder type.
No. F2-872 Package of 6 **$.29 Net/pkg.**

D Banana Jacks; insulated; complete with mounting hardware.
No. F2-875 One each black and red **$.45 Net/pr.**

E Test Tip Jacks; insulated; fits all standard Test and Phone Tips.
No. F2-879 One each black and red **$.37 Net/pr.**

F Combination Jacks; insulated; fits both Banana, Test and Phone Tips.
No. F2-883 One each black and red **$.55 Net/pr.**

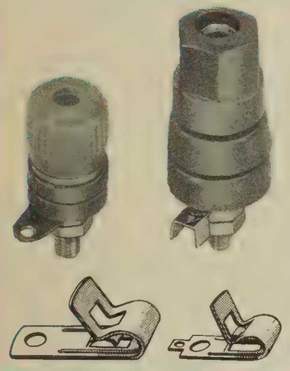
G Auto Antenna Plug; "Motorola" type. For auto radio, test, and CB equipment.
No. F2-898 **$.29 Net/ea.**



TEST LEADS AND PRODS

One piece molded, unbreakable construction make these among the best available at any price. Replacement test prods are molded of hi-dielectric unbreakable plastic with solderless wire connections and have sturdy, pointed tips.

No. F2-938 **$ .98/Pr. Net**
Leads 30" with Test (Phone) Tip ends
No. F2-940 **$ .98/Pr. Net**
Leads, 30" with Banana Plug ends
No. F2-946 **$ .75/Pr. Net**
Test prods, Black or Red



BINDING POSTS AND FAHNESTOCK CLIPS

BINDING POSTS are ideal for making connections to instruments, educational projects, audio equipment, etc. They accept Banana, Test, and Phone Tip Plugs; Spade Lugs; Alligator Clips, and bare wires. Fully insulated mounting. Supplied in pairs of one each red and black.

No. F2-926 Small size **$.69 Net/pr.**
No. F2-930 Heavy duty type **$.98 Net/pr.**

FAHNESTOCK CLIPS provide an inexpensive means to make wire connections to "breadboards" and Experimentors "projects".

No. F2-920 **$ .35 Net/pkg.**
Pkg. of 10—small size
No. F2-922 **$ .45 Net/pkg.**
Pkg. of 10—medium size

POWER SUPPLY PLUGS AND JACKS

These plugs and jacks are used extensively on imported battery operated tape recorders, CB sets, radios, etc., to connect power supplies. Easy to attach or install.

H Package of one each of the two standard size plugs.
No. F3-140 **$ .59/Pkg. Net**

I Chassis mounting jack. Designed to disconnect batteries when plug is inserted.
No. F3-145 **$ .49/Ea. Net**

ALLIGATOR AND BATTERY CLIPS

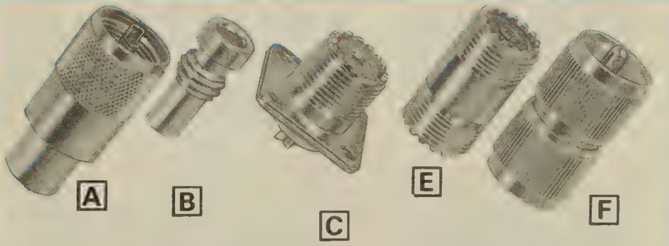
J Min. size (1"), with flexible insulation. Solder connection.
No. F2-902 One each black and red **$.29 Net/pr.**

K Standard size (2"), with screw for wire attachment with or without solder; also fits Banana Plug.
No. F2-904 Package of 2 **$.29 Net/pkg.**

L Medium size (1½"), otherwise same as min. (J) above.
No. F2-906 One each black and red **$.32 Net/pr.**

M Alligator clip adaptor. Fits Banana, Test & Phone Tip Plugs.
No. F2-910 One each black and red **$.90 Net/pr.**

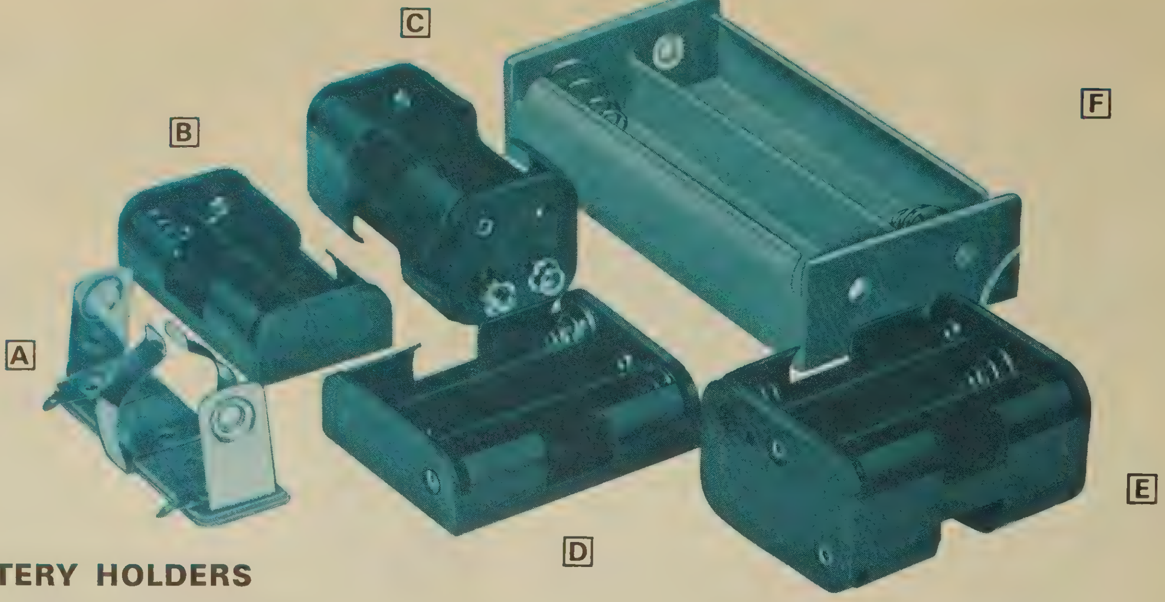
N Test and battery clips; (2"); 5 amp; insulated; with screws.
No. F2-913 One each black and red **$ 45 Net/pr.**



RF - UHF COAXIAL CONNECTORS

These high quality connectors and adaptors are precision made of brass or die cast zinc. Silver plated for lowest possible contact resistance.

A	**No. F3-120**	Connector, Type PL 259	**$ .85 Net**
B	**No. F3-121**	Reducer, Type UG-175/U, adapts RG 58/U cable to standard connectors	**.28 Net**
B	**No. F3-122**	Reducer, Type UG-167/U, adapts cables RG-59/61/71 U to standard connectors.	**.28 Net**
C	**No. F3-123**	Receptacle, Type SO 239	**.69 Net**
E	**No. F3-124**	Adaptor, Type PL 258, for coupling or splicing connectors and cables.	**1.15 Net**
F	**No. F3-125**	Adaptor, double male.	**1.48 Net**



BATTERY HOLDERS

"AA" (PENLIGHT) CELL HOLDERS

Fig.	Cat. No.	Type	Net
B	**F3-057**	2 Cells - 3 Volt	**$.39**
D	**F3-058**	3 Cells - 4½ Volt	**.45**
C	**F3-059**	4 Cells - 6 Volt	**.45**
E	**F3-060**	6 Cells - 9 Volt	**.62**

Above connect with Battery Snap No. F3-052 listed below.

"C" (FLASHLIGHT TYPE) CELL HOLDERS

Fig.	Cat. No.	Type	Net
A	**F3-062**	1 Cell - 1½ Volt	**$.39**
B	**F3-063**	2 Cells - 3 Volt	**.57**
F	**F3-064**	4 Cells - 6 Volt	**.62**

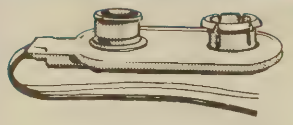
Above connect with wires.

"D" (FLASHLIGHT TYPE) CELL HOLDERS

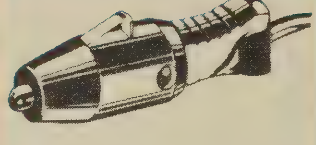
Fig.	Cat. No.	Type	Net
A	**F3-065**	1 Cell - 1½ Volt	**$.39**
B	**F3-066**	2 Cells - 3 Volt	**.59**
D	**F3-067**	3 Cells - 4½ Volt	**.65**
E	**F3-068**	6 Cells - 9 Volt	**1.25**

Above connect with wires.

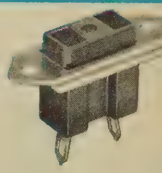
BATTERY CLIPS; male and female type. Fits most snap type batteries, except 9V transistor.
No. F3-050 **$.29 Net**
One pair



BATTERY CONNECTOR; Fits standard 9V transistor batteries and size AA (Penlight) battery holders shown above.
No. F3-052 **$.29 Net**
Pkg. of 2



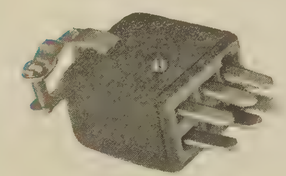
CIGARETTE LIGHTER PLUG; To connect CB Sets, warning lights, bottle warmers, etc. to auto dash receptacle.
No. N4-029 **$.75 Net**

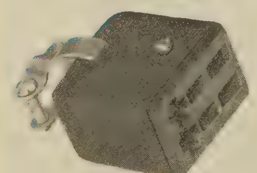


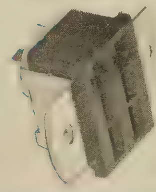
A. C. RECEPTACLE; chassis mounting; mounting centers: 1⅛". UL rated at 15 A - 125V; solder terminals.
No. F3-100 **$.28 Net**

MULTI-CONDUCTOR CORD AND CHASSIS CONNECTORS

Suited for all electronic and electrical applications. Shells are attached with screws for easy assembly. Pins are "indexed"; plugs of one type will not fit socket of another type. Max. rating is 500V - 7½ amp - 1800 Watt.



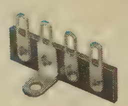




MALE CORD CONNECTORS		Net
No. F3-150	2 Pin	$ .64
No. F3-151	3 Pin	.69
No. F3-152	4 Pin	.79
No. F3-153	6 Pin	.87
No. F3-154	8 Pin	1.05
FEMALE CORD CONNECTORS		
No. F3-160	2 Pin	$ .69
No. F3-161	3 Pin	.79
No. F3-162	4 Pin	.89
No. F3-163	6 Pin	1.05
No. F3-164	8 Pin	1.19
CHASSIS MOUNTED CONNECTOR		
No. F3-170	2 Pin	$ .39
No. F3-171	3 Pin	.45
No. F3-172	4 Pin	.55
No. F3-173	6 Pin	.59
No. F4-174	8 Pin	.69

TERMINAL STRIPS; Solder type, very compact and space-saving.

		Net
No. F3-212	2 Lug, Pkg. of 5	$ .29
No. F3-213	3 Lug, Pkg. of 4	.29
No. F3-214	4 Lug, Pkg. of 3	.29
No. F3-216	6 Lug, Pkg. of 2	.29

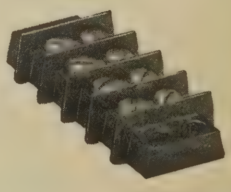


TERMINAL STRIPS; Screw type, for chassis or cabinet mounting.

		Net
No. F3-225	2 Screw, Pkg. of 2	$ .29
No. F3-227	4 Screw, Pkg. of 1	.25
No. F3-229	6 Screw, Pkg. of 1	.37

TERMINAL STRIPS; Barrier type, molded phenolic; for maximum safety.

		Net
No. F2-234	2 Term.	$ .39
No. F2-236	4 Term.	.55
No. F2-238	6 Term.	.65



No. F2-236

CAPACITORS — WHAT THEY ARE AND HOW TO USE 'EM!

Capacitors are used in practically all electronic circuits — to store electrical energy, most often. Other uses include blocking DC current while letting AC current pass, as a buffer, as a tuning device in RF circuits, to start motors, etc. They come in many different types and names: electrolytic, ceramic, mica, disk, Mylar, tubular, each with its value stamped or color coded on the outside in microfarads (μF, mf, or MFD) or picofarads (pF or mmf). Picofarads are one millionth of a micofarad, so 0.001 μF is the same as 1000 pF.

Value and voltage rating and sometimes tolerance are what's important, in most cases, since the various shapes can quite often be substituted for each other without any problem.

6 TIPS ON USING CAPACITORS

1. WORKING VOLTAGE means maximum voltage, so capacitors can usually be used to replace any capacitor of the same or lower value. A 600-volt capacitor, for example, can replace any unit rated up to 600 volts. The only exception to this rule is covered in item five.

2. PARALLEL CONNECTIONS are how you can get special values. Just use similar types and add their values. To get 0.06 μF capacitance, for example, just connect a 0.05 μF unit to a 0.01 μF unit in parallel.

3. FILTER CAPACITOR VALUES aren't usually critical. You can use a 40 μF electrolytic capacitor, for example, in place of units rated at 20 or 30 μF.

4. POLARITY is important when you're using electrolytic capacitors. Each has a plus lead and a minus lead and must be connected properly.

5. ELECTROLYTIC CAPACITORS shouldn't be used at above or very far blow their ratings. A 25-volt electrolytic capacitor, for example, is OK to substitute for any unit specified at from 10 to 25 volt unit. But don't try using a 150 volt capacitor instead of a 25 volt unit. Because, even though it won't cause damage, it might change the unit's capacitance.

6. OPEN CAPACITORS can be checked by connecting a replacement across them in parallel. If that eliminates the problem, you know the original capacitor should be replaced.

SILVER MICA CAPACITORS

These are precision capacitors for circuits requiring close tolerance, stability, and dependability. Rated @ 500 Volt. Tolerance 5%.

Cat. No.	Rating	Net
A1-001	10pF	$ .25
A1-003	33pF	.25
A1-004	47pF	.25
A1-005	68pF	.25
A1-006	100pF	.25
A1-008	220pF	.29
A1-010	270pF	.29
A1-011	330pF	.35
A1-013	470pF	.42
A1-014	560pF	.47
A1-016	.001MF	.69

DISC CAPACITORS

MINIATURE, LOW VOLTAGE TYPE

Extremely compact. Ideally suited for transsistor circuits and miniature assemblies. Rating: 50 Volt; Tolerance 20%.

		Net	
A1-026	0.001μF	$.25	Pkg of 2
A1-027	0.002μF	.25	Pkg. of 2
A1-028	0.005μF	.25	Pkg. of 2
A1-029	0.01 μF	.25	Pkg. of 2
A1-030	0.02μF	.25	Pkg. of 2
A1-031	0.05μF	.21	Ea.
A1-032	0.1μF	.28	Ea.

STANDARD 1000 VOLT TYPE

High quality, compact and reliable capacitors. Minimum capacity change with varying temperature. Rating: 1000 Volt; Tolerance: 20%.

		Net	
A1-060	220pF	$ .25	Pkg. of 2
A1-061	330pF	.25	Pkg. of 2
A1-062	470pF	.25	Pkg. of 2
A1-063	680pF	.25	Pkg. of 2
A1-064	0.001μF	.19	Ea.
A1-065	0.005μF	.19	Ea.
A1-066	0.01μF	.19	Ea.

MYLAR® PAPER CAPACITORS

The finest "by-pass" type capacitors combining the outstanding features of Mylar with the heat and moisture resistant properties of epoxy, used as case. Rating: 600 Volt; Tolerance: 10%.

		Net
A1-075	0.001μF	$ .22
A1-076	0.002μF	.22
A1-077	0.003μF	.22
A1-078	0.005μF	.22
A1-079	0.01μF	.24
A1-080	0.02μF	.26
A1-081	0.05μF	.29
A1-082	0.10μF	.38
A1-083	0.25μF	.49

® T. M. DUPONT CO.

ELECTROLYTIC CAPACITORS

Miniature type for transistor circuits and other low voltage applications. They are very small and encased in insulated, hermetically sealed aluminum shells.

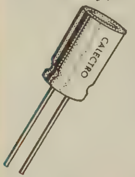
12 VOLT SERIES—AXIAL LEADS

For use where 3 to 12 Volt types are specified.

Cat. No.	Rating	Net
A1-102	5μF	$ .29
A1-104	10μF	.29
A1-106	30μF	.29
A1-108	50μF	.37
A1-110	100μF	.39
A1-112	200μF	.45

12 VOLT SERIES—PARALLEL LEADS

For printed circuit mounting and where 3 to 12 Volt types are specified.



Cat. No.	Rating	Net
A1-103	5μF	$ .29
A1-105	10μF	.29
A1-107	30μF	.29
A1-109	50μF	.37
A1-111	100μF	.39
A1-113	200μF	.45

25 VOLT SERIES—AXIAL LEADS

For use where 15 to 25 Volt types are specified.

Cat. No.	Rating	Net
A1-125	2μF	$ .33
A1-126	5μF	.33
A1-127	10μF	.33
A1-128	25μF	.33
A1-129	50μF	.39
A1-130	100μF	.48
A1-131	200μF	.55
A1-132	500μF	.95
A1-133	1000μF	1.40
A1-134	2000μF	1.95

50 VOLT SERIES—AXIAL LEADS

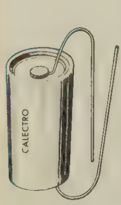
For use where 30 to 50 Volt types are specified.

Cat. No.	Rating	Net
A1-151	10μF	$ .35
A1-152	25μF	.35
A1-153	50μF	.45
A1-154	100μF	.57
A1-155	200μF	.79
A1-156	500μF	1.09
A1-157	1000μF	1.60
A1-158	2000μF	2.95

150 VOLT SERIES

Cat. No.	Rating	Net
A1-165	10μF	$ .69
A1-166	20μF	.79
A1-167	40μF	.89
A1-168	60μF	.99
A1-172*	50/30μF	1.29
A1-173*	80/50μF	1.55

*Dual units containing two capacitors



450 VOLT SERIES

Cat. No.	Rating	Net
A1-176	2μF	$ .76
A1-177	4μF	.76
A1-178	10μF	.86
A1-179	20μF	1.02
A1-180	40μF	1.19
A1-181	60μF	1.55

VARIABLE (TUNING) CAPACITORS

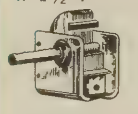
PRECISION MINIATURE TYPES

Exceptionally sturdy, vibration and temperature resistant construction with glazed ceramic insulation. Excellent for short wave and VHF Tuning, ¾″ long shaft.

		Net
A1-225	30pF (min. 2.9pF)	**$1.85**
A1-226	100pF (min. 5.0pF)	**$2.25**

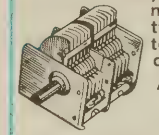
BROADCAST RECEIVER TYPES

AIR DIELECTRIC STYLE. Ball bearings. Single gang, midget type for small radios, science projects, etc. Approx. size ⅞″ deep x 1½″ x 1½″.



		Net
A1-227	365pF (10pF min.)	**$1.25**

DUAL GANG; small precision type with trimmers, for TRF receivers requiring two ganged 365pF type capacitors. Approx. size 1¾″ deep x 1¾″ x 1⅜″.



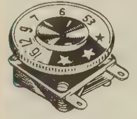
		Net
A1-228	365/365pF	**$2.25**

DUAL GANG, (miniature). Similar to A1-288 above but superhet type for circuits with IF frequency of 455kHz. With trimmers on each section. Size 1″ deep x 1 3/16″ x 1 3/16″.

		Net
A1-229	178/72pF	**$1.40**

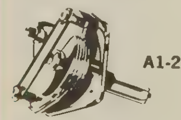
SOLID DIELECTRIC TYPES

SINGLE GANG, with dial. For simple receivers, science projects, etc. Dial calibrated for broadcast band. Only 1″ square, ½″ deep.



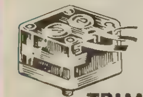
		Net
A1-232	365pF (min. 13pF)	**$.99**

SINGLE GANG, same as A1-232 above, but with ¼″ diam. shaft, ¾″ long. Without dial.



		Net
A1-233	365pF (min. 13pF)	**$.95**

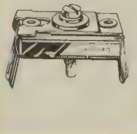
DUAL GANG. Transistor radio type; complete with 1 - 3/16″ diam. dial. Only 13/16″ square, 7/16″ deep. Has trimmers.



Cat. No.	Rating	Net
A1-234	138/62pF	$1.35

TRIMMER CAPACITORS

LOW LOSS CERAMIC BASE. Mica insulation. ⅜″ wide by ⅝″ (A1-245/6) or ⅞″ (A1-247/8/9) long.



Cat. No.	Rating	Net
A1-245	7pF (0.9 min.)	$ .40
A1-246	40pF (4 min.)	.40
A1-247	60pF (7 min.)	.45
A1-248	300pF (55 min.)	.59
A1-249	600pF (170 min.)	.87

RESISTORS — WHAT THEY ARE AND HOW TO USE THEM

A resistor, as the name denotes, offers resistance to the flow of electric current. Electronic circuits, as a rule, incorporate many resistors to reduce or limit voltage, to isolate or filter circuits, to act as a "load" for tubes or transistors, etc.

The value of a resistor is shown in ohm, K-ohm (thousands of ohm), or megohm (millions of ohm). The standard resistor has no "polarity". It can be wired in the circuit either way.

Wattage rating refers to the maximum amount of power the unit can dissipate as heat. Space permitting, a higher wattage unit may always be used as a replacement for lower wattage types.

Tolerance refers to the possible variation from nominal value. For example, a 100 ohm, 10% resistor may have an actual value between 90 and 110 ohms.

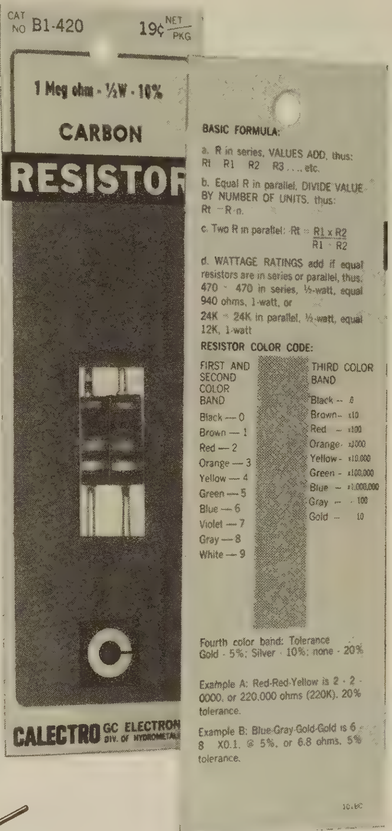
Series connections may be used to obtain higher values. When series-connected, resistance values are additive. Wattage ratings are not additive unless all the units have the same resistance value. For example, two 47 ohm, ½ watt resistors connected in series have a total resistance of 94 ohms and a 1 watt power rating.

Parallel connections may be used to obtain lower values. When parallel-connected, the resistance is less than that of the lowest value in the group. Actual resistance may be determined by formula. If resistances are all the same value, simply divide by the number used to obtain resistance and multiply to obtain wattage rating. For example, if three (3) 15 ohm, 1 watt resistors are connected in parallel, the combination has a resistance of 5 ohms and a 3 watt power rating.

If a replacement resistor of proper value overheats, it usually indicates a short circuit, a defective capacitor or tube, or a leaky or shorted transistor.

The word ohm is usually abbreviated by using the Greek letter Ω (omega).

Calectro Resistors are packaged on individual cards showing values, color code and formulas.



CAT NO B1-420 19¢ NET/PKG

1 Meg ohm - ½W - 10%

CARBON

RESISTOR

CALECTRO GC ELECTRON DIV. OF HYDROMETAL

BASIC FORMULA:

a. R in series, VALUES ADD, thus: Rt = R1 + R2 + R3 . . . etc.

b. Equal R in parallel, DIVIDE VALUE BY NUMBER OF UNITS, thus: Rt = R ÷ n.

c. Two R in parallel: $Rt = \frac{R1 \times R2}{R1 + R2}$

d. WATTAGE RATINGS add if equal resistors are in series or parallel, thus, 470 + 470 in series, ½-watt, equal 940 ohms, 1-watt, or 24K + 24K in parallel, ½-watt, equal 12K, 1-watt

RESISTOR COLOR CODE:

FIRST AND SECOND COLOR BAND
Black — 0
Brown — 1
Red — 2
Orange — 3
Yellow — 4
Green — 5
Blue — 6
Violet — 7
Gray — 8
White — 9

THIRD COLOR BAND
Black — .0
Brown — x10
Red — x100
Orange — x1000
Yellow — x10,000
Green — x100,000
Blue — x1,000,000
Gray — .100
Gold — .10

Fourth color band: Tolerance Gold - 5%; Silver - 10%; none - 20%

Example A: Red-Red-Yellow is 2 - 2 - 0000, or 220,000 ohms (220K). 20% tolerance.

Example B: Blue-Gray-Gold-Gold is 6 - 8 X0.1, @ 5%, or 6.8 ohms. 5% tolerance.

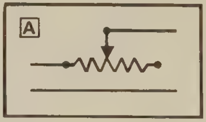
10.BC

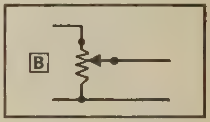
Potentiometers and Variable Resistors

The term variable resistors and "potentiometers" is usually used for the same items. They are also referred to as "controls", and heavy duty types are called "rheostats". Technically speaking, a variable resistor has two connections—one to the movable contact, and the other to one end of the resistor (Fig. A). A potentiometer is wired to both ends of the resistor and to the movable contact (Fig. B).

Like fixed resistors, the current and the voltage applied to a potentiometer must be kept within the specified limits. Otherwise, the device will heat up or even burn out.

The "taper" of a control refers to the resistance variation versus rotation. Linear tapers are used for general application. For volume controls, "audio tapers" are preferred, as they compensate for the nonlinear characteristics of the human ear. Potentiometers are widely used for volume, sensitivity or tone controls, to vary or divide voltages, etc.



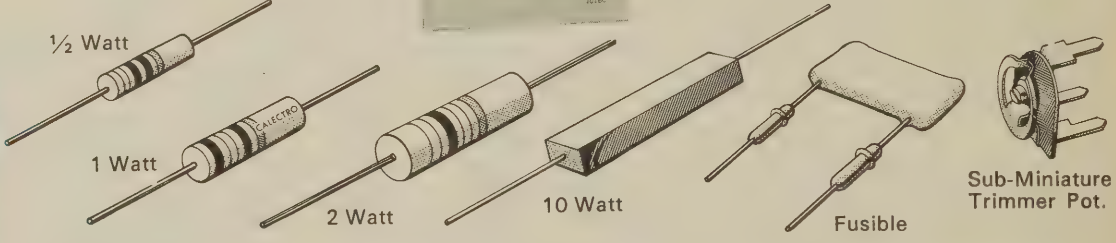


CARBON TYPE

½ Watt - 10%

Price: $.19 / Pkg. of 2

Cat. No.	Ohm
B1-360	10
B1-362	15
B1-365	27
B1-368	47
B1-372	100
B1-374	150
B1-376	220
B1-378	330
B1-380	470
B1-384	1000
B1-386	1500
B1-388	2200
B1-389	2700
B1-390	3300
B1-392	4700
B1-394	6800
B1-395	8200
B1-396	10 K
B1-398	15 K
B1-400	22 K
B1-401	27 K
B1-402	33 K
B1-404	47 K
B1-406	68 K
B1-408	100 K
B1-410	150 K
B1-412	220 K
B1-413	270 K
B1-414	330 K
B1-416	470 K
B1-420	1 MEG
B1-424	2.2 MEG
B1-425	3.3 MEG
B1-426	4.7 MEG
B1-430	10 MEG



CARBON TYPE

1 Watt - 10%

Price: $ .19 Each

Cat. No.	Ohm
B1-460	10
B1-463	47
B1-465	100
B1-467	220
B1-469	470
B1-471	1 K
B1-473	2.2 K
B1-474	2.7 K
B1-475	3.3 K
B1-476	4.7 K
B1-478	10 K
B1-479	15 K
B1-480	22 K
B1-481	33 K
B1-482	39 K
B1-483	47 K
B1-484	68 K
B1-485	100 K
B1-486	150 K
B1-487	270 K
B1-489	470 K
B1-490	1 MEG

CARBON TYPE

2 Watt - 10%

Price: $.25 Each

Cat. No.	Ohm
B1-507	10
B1-509	22
B1-513	47
B1-516	82
B1-517	100
B1-519	150
B1-521	220
B1-523	270
B1-525	330
B1-526	470
B1-528	1 K
B1-530	1.5 K
B1-532	2.2 K
B1-534	3.3 K
B1-538	4.7 K
B1-540	6.8 K
B1-541	8.2 K
B1-542	10 K
B1-544	15 K
B1-546	22 K
B1-547	27 K
B1-549	47 K
B1-552	100 K

WIRE WOUND

10 Watt - 10%

Price: $.36 Each

Cat. No.	Ohm
B1-565	10
B1-568	50
B1-569	75
B1-570	100
B1-572	175
B1-574	250
B1-576	400
B1-578	500
B1-580	750
B1-581	1 K
B1-583	1.5 K
B1-585	2.5 K
B1-586	3 K
B1-588	4 K
B1-590	5 K
B1-591	5.6 K
B1-592	6.8 K
B1-593	7.5 K
B1-594	8.2 K
B1-595	10 K
B1-597	15 K

Sub-Miniature Trimmer Potentiometers

Ideal for circuits where a resistance value may need adjusting for proper operation. Only ⅜" diameter. Lugs bend easily for printed circuit or conventional wiring. Adjusts with screwdriver. Control is linear and rated at 1/10 Watt.

Cat. No.			
B1-642	500 ohm	**$ .39**	**Net**
B1-643	2 K ohm	**.39**	**Net**
B1-644	10 K ohm	**.39**	**Net**
B1-645	50 K ohm	**.39**	**Net**
B1-646	100 K ohm	**.39**	**Net**
B1-648	500 K ohm	**.39**	**Net**

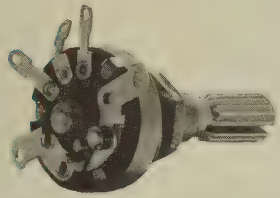
Fusible Resistor - 7½ ohm

Popular replacement for many TV sets, including Admiral, Zenith, Westinghouse, Sears, Motorola, Philco, etc.

Cat. No. B1-625 **$ .33 Net**

Miniature Potentiometers with Switch

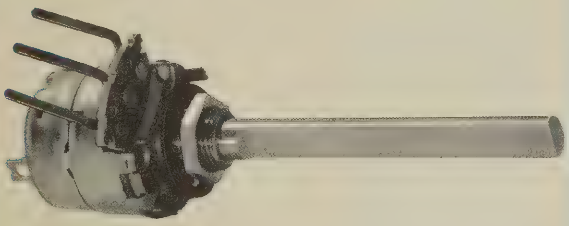
For all applications where a very small control is desirable. Only 11/16″ diam.; 7/16″ deep, including switch. Linear taper, rated at ¼ Watt. Switch will handle 1 Amp @ 12 Volt or ¼ Amp @ 48 Volt. Shaft extends ¾″ and will fit knurled or set-screw type knobs.



Cat. No	Ohm	Net
B1-660	1 K	$ .95
B1-661	5 K	.95
B1-662	10 K	.95
B1-664	50 K	.95
B1-665	100 K	.95
B1-666	500 K	.95

Standard Potentiometers

This is the most popular type of control used in radios, TV's and other electronic equipment. Rating is ½ Watt min. - 2 Watt max. depending on application. Diameter is ⅞″. Shaft will fit knobs with spring or set-screw and is 2½″ long; easily cut to any shorter size.



Cat. No.	Ohm	Taper*	Switch	Net
B1-680	5 K	L	No	$1.17
B1-681	5 K	A	No	1.17
B1-682	5 K	A	Yes	1.77
B1-683	10 K	L	No	1.17
B1-685	50 K	L	No	1.17
B1-686	100 K	L	No	1.17
B1-687	500 K	L	No	1.17
B1-688	500 K	A	No	1.17
B1-689	500 K	A	Yes	1.77
B1-690	1 Meg	L	No	1.17
B1-691	1 Meg	A	No	1.17
B1-692	1 Meg	A	Yes	1.77
B1-693	5 Meg	L	No	1.17

*L = Linear A = Audio

Transistor Radio Volume Controls

For replacement in transistor radios or for hobby projects requiring a small, flat control. Has built-in on/off switch and is supplied with 15/16″ diam. dial. Control is ⅝″ diam. and total depth, including dial, is 7/16″

Cat. No. B1-673 5 K ohm **$ .75 Net**

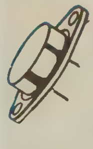
Cat. No. B1-674 10 K ohm **$ .75 Net**

"HOBBY-PACK" SEMICONDUCTORS

Pack of 3
PNP-GNL. PURPOSE AUDIO/RF GERMANIUM TRANSISTOR
TO-5 case; typ. gain-60; max. operat. Volt-12; freq. to 2mHz.
K4-500 Pkg of 3 **$.99 Net**

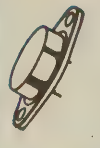
Pack of 1
PNP-HI POWER GERMANIUM TRANSISTOR
TO-3 case; typ. gain-50; max. operat. Volt-15; max. power-35W.
K4-520 Pkg of 1 **$.99 Net**

Pack of 3
NPN-GNL. PURPOSE AUDIO/RF GERMANIUM TRANSISTOR
TO-5 case; typ. gain-60; max. operat. Volt-12; freq. to 2mHz.
K4-501 Pkg of 3 **$.99 Net**



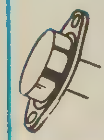
Pack of 2
PNP-POWER GERMANIUM TRANSISTOR
TO-3 case; typ. gain-50; max. operat. Volt-12; max. power-10W.
K4-521 Pkg of 2 **$.99 Net**

Pack of 3
PNP-GNL. PURPOSE AUDIO/RF SILICON TRANSISTOR
TO-92/98 case; typ. gain-60; max. operat. Volt-12; freq. to 50 mHz; power-½W.
K4-505 Pkg of 3 **$.99 Net**



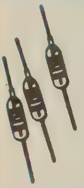
Pack of 1
NPN-HIGH POWER SILICON TRANSISTOR
TO-3 case; typ. gain-60; max. operat. Volt-50; max. power-85W.
K4-525 Pkg of 1 **$.99 Net**

Pack of 3
NPN-GNL. PURPOSE AUDIO/RF SILICON TRANSISTOR
TO-5 case; typ. gain-50; max. operat. Volt-12; freq. to 50 mHz; power-½W.
K4-506 Pkg of 3 **$.99 Net**



Pack of 2
NPN-POWER SILICON TRANSISTOR
TO-3 case; typ gain-60; max. operat. Volt-15; max. power-25W.
K4-526 Pkg of 2 **$.99 Net**

Pack of 2
NPN-HIGH GAIN AUDIO AND RF SILICON TRANSISTOR
TO-5 case; typ. gain-150; max. operat. Volt.-12; freq. to 50 mHz; power-½W.
K4-507 Pkg of 2 **$.99 Net**



Pack of 5
GNL. PURPOSE GERMANIUM SIGNAL DIODE
Replacement for 1N34, 1N34A, 1N60, etc.
K4-550 Pkg of 5 **$.59 Net**

Pack of 2
NPN-HIGH FREQUENCY SILICON TRANSISTOR
TO-92 case; typ. gain-150; max. operat. Volt-15; freq. to 500 mHz; 0.3 Watt.
K4-510 Pkg of 2 **$.99 Net**

Pack of 2. SILICON RECTIFIERS, 1 AMP.
For use in all types of AC power supplies
50 PIV type; for use with AC input of 20V max.
K4-555 Pkg of 2 **$.65 Net**
400 PIV type; for use with AC input of 130V max.
K4-557 Pkg of 2 **$.99 Net**

SEMICONDUCTOR CROSS REFERENCE

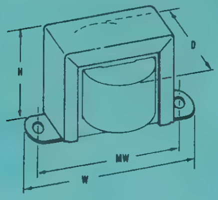
Items cross referenced are electrically and mechanically identical or very similar. They will, in most cases, perform completely satisfactorily as a replacement provided, however, they are not operated at higher voltages or power ratings than specified.

TYPE	CALECTRO	TYPE	CALECTRO	TYPE	CALECTRO	TYPE	CALECTRO	TYPE	CALECTRO
1N 34	K4-550	2N 148	K4-501	2SD 26	K4-526	DS 16	K4-500	HEP 254	K4-500
1N 34A	K4-550	2N 155	K4-521	27-1701	K4-500	DS 17	K4-500	HEP 641	K4-501
1N 60	K4-550	2N 156	K4-521	27-1702	K4-500	DS 19	K4-500	MPS 6521	K4-507
2N 35	K4-501	2N 160	K4-506	27-1705	K4-521	DS 21	K4-500	SK 3003	K4-500
2N 36	K4-500	2N 161	K4-506	27-1706	K4-521	DS 23	K4-500	SK 3004	K4-500
2N 37	K4-500	2N 162	K4-506	27-1708	K4-557	DS 26	K4-500	SK 3009	K4-521
2N 39	K4-500	2N 170	K4-501	276-403	K4-500	GE 2	K4-500	SK 3010	K4-501
2N 40	K4-500	2N 182	K4-501	276-404	K4-500	GE 3	K4-521	SK 3011	K4-501
2N 41	K4-500	2N 197	K4-500	276-405	K4-500	GE 5	K4-501	SK 3013	K4-521
2N 43	K4-500	2N 199	K4-500	276-406	K4-520	GE 6	K4-501	SK 3018	K4-507
2N 46	K4-500	2N 255	K4-520	276-408	K4-501	GE 7	K4-501	SK 3019	K4-510
2N 47	K4-500	2N 270	K4-500	276-409	K4-501	GE 8	K4-501	SK 3020	K4-507
2N 50	K4-500	2N 506	K4-500	276-1709	K4-550	GE 10	K4-507	SK 3027	K4-525
2N 60	K4-500	2N 520	K4-500	278-410	K4-501	GE 11	K4-510	SK 3030	K4-557
2N 78	K4-501	2N 535	K4-500	278-411	K4-501	HEP 52	K4-505	SK 3031	K4-557
2N 94	K4-501	2N 554	K4-521	40080	K4-506	HEP 53	K4-506	TR 01	K4-521
2N 97	K4-501	2N 573	K4-521	40243	K4-510	HEP 54	K4-507	TR 02	K4-521
2N 103	K4-501	2N 917	K4-510	40244	K4-510	HEP 55	K4-507	TR 04	K4-500
2N 104	K4-500	2N 918	K4-510	40245	K4-507	HEP 56	K4-510	TR 05	K4-500
2N 105	K4-500	2N 1024	K4-500	40246	K4-507	HEP 57	K4-505	TR 08	K4-501
2N 107	K4-500	2N 1025	K4-500	40263	K4-500	HEP 154	K4-555	TR 09	K4-501
2N 109	K4-500	2N 1302	K4-501	40395	K4-500	HEP 156	K4-557	TR 10	K4-501
2N 117	K4-506	2N 1304	K4-501	40464	K4-525	HEP 157	K4-557	TR 14	K4-500
2N 118	K4-506	2N 3013	K4-510	40465	K4-525	HEP 200	K4-521	TR 15	K4-500
2N 119	K4-506	2N 3391	K4-507	AA 1	K4-500	HEP 230	K4-520	TR 16	K4-521
2N 130	K4-500	2N 3392	K4-507	AA 2	K4-501	HEP 247	K4-525	TR 21	K4-506
2N 131	K4-500	2N 3403	K4-507	AA 4	K4-521	HEP 250	K4-500	TR 24	K4-510
2N 133	K4-500	2N 3404	K4-507	CK 721	K4-500	HEP 251	K4-500	TR 26	K4-526
2N 135	K4-500	2SC 241	K4-526	CK 722	K4-500	HEP 252	K4-500	TR 30	K4-505
2N 147	K4-501	2SC 494	K4-526	DS 14	K4-500	HEP 253	K4-500		

TRANSFORMERS — HOW TO USE THEM!

POWER RATINGS are the result of how much iron a transformer has in its core, and of the wire sizes used in its windings. Though higher-rated transformers are naturally larger, all Calectro transformers are designed to be as compact as possible.

POWER AND FILAMENT TRANSFORMERS deliver their specified output voltage only at their rated loads. If lightly loaded, their output voltages will be higher than specified. If over loaded, output will drop below specs and the transformer may overheat.



IMPEDANCE MATCHING is a must if you want maximum circuit efficiency in an audio transformer. Most circuits will tolerate minor mis-matchings without noticeable effect — like using a 500 ohm C.T. winding to replace a 400 ohm C. T. winding.

OUTPUT FOR INPUT? You can use transformers in "reverse." An output transformer designed to drive a speaker, for example, may be used as an input transformer to match a low impedance speaker-microphone to a transistor or tube input circuit, as for instance in an intercom.

EIA COLOR CODING. Electronic Industrial Association standard colors make it easy to identify the lead wires on American-made transformers as follows:

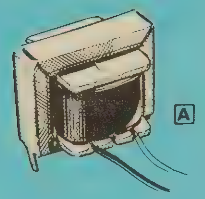
AUDIO TRANSFORMERS

Red—B+ or power
Blue—Plate or collector
Brown—Plate or collector
Green—Grid or base
Black—Bias or ground or v.c.
Yellow—Grid or base or v.c.

NOTE: Imported equipment does not always use EIA color coding.

POWER TRANSFORMERS

Black—Primary
Red—High voltage secondary
Red/Yellow—High voltage C.T.
Yellow—Rectifier filament
Green—Tube filament
Green/Yellow—Filament C.T.
Brown—Extra filament
Brown/Yellow—Extra filament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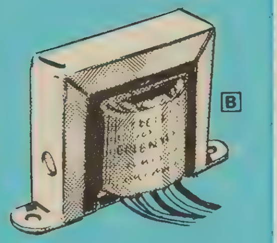
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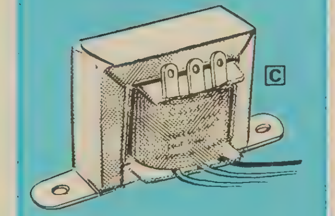
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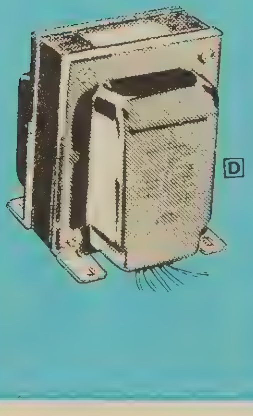

D

SUB-MINIATURE AUDIO TRANSFORMERS

For ultra compact transistor radios, sub-miniature amplifiers, hearing aids, etc., improved design using special alloy cores and nylon bobbins.

		IMPEDANCE IN OHMS		DIM. IN INCHES				
Fig.	Type	Prim.	Sec.	MW*	H	D	Cat. No.	Net
A	Input	100,000	1,000	19/32	½	½	D1-710	$ .85
A	Driver	10,000	2,000 CT	19/32	½	½	D1-711	.85
A	Output (0.1W)	500 CT	8	19/32	½	½	D1-712	.85

MINIATURE AUDIO TRANSFORMERS

These transformers fit most small transistor radios. Excellent for replacement or for building experimental circuits, science projects, etc.

		IMPEDANCE IN OHMS		DIM. IN INCHES				
Fig.	Type	Prim.	Sec.	MW*	H	D	Cat. No.	Net
A	Input	150,000	1,000	¾	⅝	⅝	D1-717	$ .95
A	Input	20,000	1,000	¾	⅝	⅝	D1-719	.95
A	Driver	10,000	2,000 CT	¾	⅝	⅝	D1-722	.95
A	Output (0.2W)	1200 CT	3.2 & 8	¾	⅝	⅝	D1-724	.95
A	Output (0.2W)	500 CT	3.2 & 8	¾	⅝	⅝	D1-726	.95

TRANSISTOR AUDIO TRANSFORMERS

This type is used extensively in the larger transistor radio, tape recorders and phono amplifiers. Exceptional quality for size and price.

		IMPEDANCE IN OHMS		DIM. IN INCHES				
Fig.	Type	Prim.	Sec.	MW*	H	D	Cat. No.	Net
A	Driver	1,000 CT	500 CT	1	¾	¾	D1-728	$1.10
A	Output (0.4W)	200 CT	3.2 & 8	1	¾	¾	D1-729	1.10
A	Output (0.5W)	500 CT	3.2 & 8	1	¾	¾	D1-730	1.10

TRANSISTOR DRIVER TRANSFORMERS

For construction of amplifiers with or without output transformers. Type D1-734 is furnished with schematic for typical 10 watt low cost, easy to build amplifier.

		IMPEDANCE IN OHMS		DIM. IN INCHES					
Fig.	Type	Prim.	Sec.	MW	W	H	D	Cat. No.	Net
B	Single or push-pull 0.5W	100 (100ma DC)	100 CT	2⅜	2 - 13/16	1⅝	1½	D1-733	$2.95
B	Push-pull Split Second 0.5W	35 (100ma DC)	2 ohm ea. ratio: 6.7:1:1	1¾	2 - 1/16	1 - 3/16	1¼	D1-734	1.96

OUTPUT TRANSFORMERS, TUBE TYPE

Universal transformers for all tube type single or push-pull amplifiers up to 8 watt. Depending on connections, these transformers will match all standard tube types.

		IMPEDANCE IN OHMS		DIM. IN INCHES					
Fig.	Type	Prim.	Sec.	MW	W	H	D	Cat. No.	Net
C	4 Watt	1,000 to 4,500	3.2 & 8	2	2⅜	1⅜	1⅜	D1-740	$2.95
C	8 Watt	2,500 to 16,000	3.2 & 8	2⅜	2 - 3/16	1¾	1⅛	D1-741	3.25

POWER SUPPLY AND FILAMENT TRANSFORMERS

For constructing power supplies for transistorized devices, battery chargers, filament supplies for tubes, etc. Highest quality; conservatively rated.

		SECONDARY		DIM. IN INCHES					
Fig.	Primary	Volt	Amp.	MW	W	H	D	Cat. No.	Net
B	117 V-60Hz	6.3 CT	1.2	2 - 13/16	2 - 13/16	1⅝	2	D1-745	$1.95
B	117 V-60Hz	12.6 CT	2	2⅜	3 - 5/16	1 - 15/16	1⅝	D1-747	3.95
B	117 V-60Hz	12.6 CT	0.1	2 - 1/16	2⅜	1⅜	1⅜	D1-750	1.39
B	117 V-60Hz	25.2 CT	0.5	2 - 13/16	3¼	2	1¾	D1-752	3.50
B	117 V-60Hz	25.2 CT	2	3 - 9/16	4	2 - 9/16	2 - 5/16	D1-753	4.75

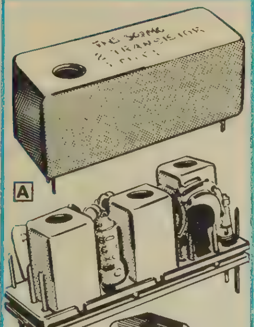
POWER TRANSFORMERS — TUBE TYPE

For radios, amplifiers and other electronic equipment using tubes.

			DIM. IN INCHES					
Fig.	Primary	Secondaries	MW	W	H	D	Cat. No.	Net
B	117 V-60Hz	1. 125V-15ma 2. 6.3V-600ma	2⅜	2 - 13/16	1⅝	1⅝	D1-760	$3.49
D	117 V-60Hz	1. 500V CT (250-250) @ 40ma 2. 6.3V CT @ 2A	1¾	2 - 11/32	2 - 25/32	2¼	D1-761	6.50

*Spacing between mounting lugs.

COILS. COIL FORMS AND I.F. STRIPS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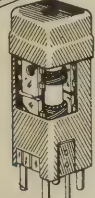
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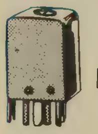
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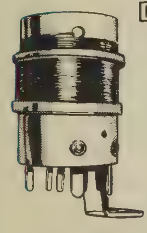
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H

A I.F. AMPLIFIER MODULE

A complete pre-assembled and pre-tuned 455 kc Amplifier Strip of latest circuit design. Incorporates 3 I.F. transformers, 2 transistors, diode and associated components. Greatly simplifies superhet receiver construction. Gain: 55 db; selectivity: 8 kHz @ 6 db; power: 6 v @ 3 mA; size 1½ x 9/16 x ½".

D1-800 Schematic No. 50 **$4.75 Net**

I.F. TRANSFORMERS

B UNIVERSAL I.F. TRANSFORMER, standard 455 kc type as used in millions of tube type radios. Suitable as universal replacements or use in experimental or construction projects. Size: ¾ x ¾ x 2". Schematic No. 51.

Cat. No. D1-814 Input Ttype **$1.65 Net**
Cat. No. D1-815 Output Type **$1.65 Net**

C MINIATURE I.F. TRANSFORMERS for use as replacements in transistor radios or in building construction and science projects. Outstanding performance for small size: ⅜" sq. x ⅝" high. Schematic No. 52. Matching Osc. Coil is No. D1-834.

D1-822	Input	50K-500 ohm	$ 94
D1-823	Interst.	30k-500 ohm	.94
D1-824	Output	20k-500 ohm	.94

OSCILLATOR COILS

D TRANSISTOR RADIO TYPE for circuits using a single osc./convert. transistor. Size: ⅜" diam. - 1" high. Schematic No. 53.

D1-830 For 365 pF Tuning Capac. **$1.74 Net**
D1-831 For 65-85 pF Tuning Capac. **$1.74 Net**

E TUBE RADIO TYPE adjustable to track with I.F. amplifiers from 100 to 550 kHz. Size ½" diam. - 1⅛" high.

D1-832 With tapped secondary winding; Schematic No. 54 **$1.20 Net**
D1-833 With capacity coupled winding; Schematic No. 53 **$1.20 Net**

C MINIATURE TRANSISTOR TYPE for use in most small transistor radios. Matches I.F. transformers D1-822/3/4. Size: ⅜" sq. - ⅝" high. Schematic No. 55.

Cat. No. D1-834 .94 Net

R. F. COILS

F BASIC R.F. COIL for demonstration or science model receivers. Single layer coils have good efficiency. The low impedance primary is wound on separate, movable sleeve. Tunes broadcast band with 365 pF capacitor. Diam.: 1⅛"; height: 2". Schematic No. 56.

Cat. No. D1-836 **$ 95 Net**

G UNIVERSAL-ADJUSTABLE R.F. COIL of small physical size. Ideal as replacement or for building broadcast band receivers. For use with any tuning capacitor from 250 thru 450 pF max. capacity. ½" diam.; 1½" long. Schematic No. 57.

Cat. No. D1-837 **$1.35 Net**

ADJUST. R.F. COILS (CHOKES)

H For use in all high frequency circuits requiring a choke. May be adjusted from top or bottom. Size: ⅜" diam. - 1⅜" long. Snap-fit in 5/16" hole. Schematic No. 60.

Cat. No.	Min. uH	Max. uH	Net
D1-850	1	2.5	**$1.02**
D1-851	2	5	**1.05**
D1-852	5	12	**1.08**
D1-853	10	25	**1.11**
D1-854	20	50	**1.20**
D1-855	60	140	**1.23**
D1-856	120	330	**1.26**
D1-857	310	860	**1.29**

I 2½ mH - 200 mA R.F. CHOKE

Used in numerous amateur and experimental circuits. Ceramic core; PI wound; 34 ohm DC resist.; 200mA max. current. 1½" long.

Cat. No. D1-859 **$ .99 Net**

ANTENNA COILS

F BASIC ANTENNA COIL of same physical size and schematic, and for same applications as Basic R.F. Coil No. D1-836.

Cat. No. D1-838 **$ .95 Net**

G UNIVERSAL, ADJUSTABLE ANTENNA COIL, small in size to fit practically any application as a universal replacement. High impedance, high "Q" primary, wound with litz wire. Adjustable for use with tuning capacitors from 250 to 450 pF. ½" diam. - 1½" long. Schematic No. 57.

Cat. No. D1-839 **$1.35 Net**

P FERRITE ANTENNA known also as "Loop-Stick." Universal, tunable antenna for use in tube or transistor circuits. Unlimited applications — from crystal set to hi-fi tuner. Universal mounting bracket included. ½" diam. - 2¾" long. Schematic No. 58.

Cat. No.	Tuning Capac.	Net
D1-841	250-450 pF	**$ .85**
D1-842	100-250 pF	**.95**

J FERRITE BAR ANTENNAS are ideally suited for construction of broadcast band transistor radios or as replacements. Separate primary and secondary windings permit use in any standard circuit. Schematic No. 59.

Cat. No.	Length (Inch)	Induct. uH	Tuning Capac. (pF)	Net
D1-844	2	480	160-170	**$ 79**
D1-845	3⅛	480	160-170	**.90**
D1-846	2	650	125-145	**.79**
D1-847	3⅛	650	125-145	**.90**
D1-848	3⅛	235	350-380	**.95**

COIL FORMS

L HORIZONTAL MOUNTING, P.C. TYPE with tunable ferrite slug. 4 terminals. Diam.: 7/32" length: 11/16". For coil frequencies to 25 mc.

Cat. No. D1-889 **$ .85 Net**

K VERTICAL MOUNTING, P.C. TYPE. Ferrite slug tuned. Frequency range to 25 mc. 4 terminals. Diam.: 7/32" - length: ⅝".

Cat. No. D1-890 **$ .75 Net**

M CERAMIC, SINGLE HOLE MOUNTING TYPE. Supplied with tunable ferrite core, adjustable from top or bottom. Frequency range to 25 mc.

Cat. No.	Diam.	Length	Net
D1-893	7/32"	19/32"	**$ .95**
D1-895	⅜"	1"	**1.05**
D1-896	½"	1½"	**1.14**

N PLUG-IN STYLE, perfect for winding all types of coils for experimental circuits and hobby or science projects. Excellent for short wave sets, wavemeters, etc. Low loss phenolic with 4 pin base. Diam.: ⅝" - length: 1¼".

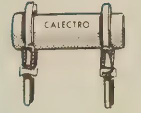
D1-898 One form and one socket **$ .79 Net**
D1-899 One form only **$ .45 Net**

I

P

J

K



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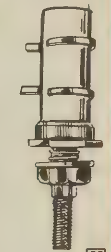
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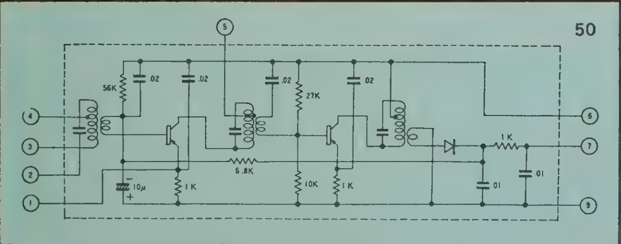
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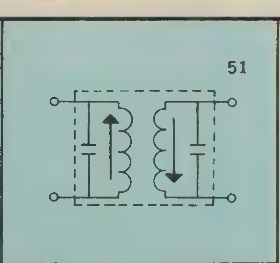
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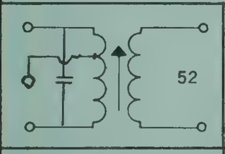
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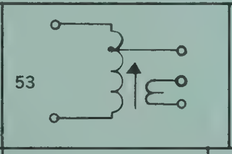
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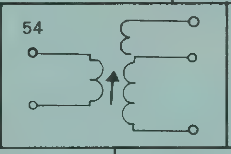
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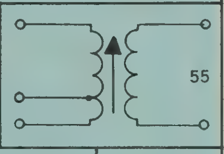
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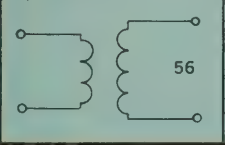
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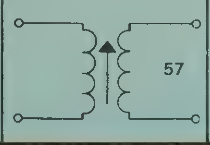
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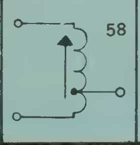
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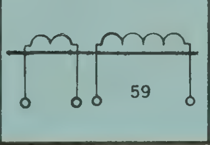
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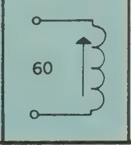
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MILLER TO CALECTRO CROSS REFERENCE

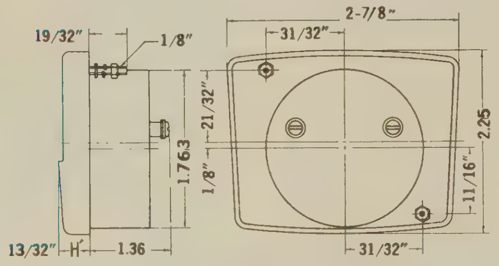
Coils listed are electrically and mechanically identical or similar. They will, in most cases, perform completely satisfactorily as a replacement.

Miller	Calectro	Miller	Calectro	Miller	Calectro
12 C 1	D1-814	24A024-6	D1-889	2020	D1-830
12 C 7	D1-814	24A014-6	D1-890	2022	D1-831
13 C 9	D1-814	69-OSC	D1-832	2065	D1-834
14 C 1	D1-814	70-A	D1-839	2066	D1-822
14 C 7	D1-814	70-OSC	D1-833	2067	D1-823
14 C 9	D1-814	70-RF	D1-837	2068	D1-824
16 PC 1	D1-814	2000	D1-848	4002	D1-850
12 C 2	D1-815	2001	D1-848	4003	D1-851
12 C 8	D1-815	2002	D1-841	4004	D1-852
12 C 10	D1-815	2003	D1-847	4005	D1-853
14 C 2	D1-815	2004	D1-848	4006	D1-854
14 C 8	D1-815	2005	D1-847	4007	D1-855
14 C 10	D1-815				
16 PC 2	D1-815	2007	D1-842	4008	D1-856
20-A	D1-838	2009	D1-844	4009	D1-857
20 RF	D1-836	2010	D1-846	4340	D1-893
				4400	D1-859
				4537	D1-859
				8902(B)	D1-800

PRECISION PANEL METERS

Economical, high quality, dependable meters in outstanding modern styling.

- Rugged construction — 2% accuracy
- Hand calibrated; linear dial scales
- D'Arsonaval movement with jeweled bearings
- Crystal clear plastic coverplate



DC CURRENT TYPES

D1-910	0-50 Microamp	**$7.95 Net**
D1-912	0-1 Milliamp	**4.95 Net**
D1-914	0-50 Milliamp	**4.95 Net**
D1-915	0-100 Milliamp	**4.95 Net**
D1-916	0-500 Milliamp	**4.95 Net**
D1-917	0-10 Ampere	**4.95 Net**

DC VOLT TYPES

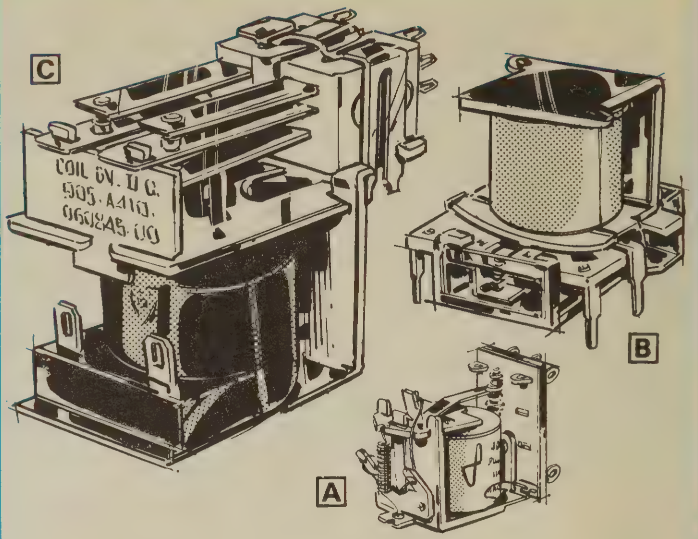
D1-920	0-15 Volt	**$4.95 Net**
D1-921	0-120 Volt	**4.95 Net**
D1-922	0-600 Volt	**4.95 Net**

AC VOLT TYPES

D1-925	0-15 Volt	**$4.95 Net**
D1-926	0-150 Volt	**4.95 Net**

SPECIAL TYPES

D1-930	VU Meter (Calibr.: —20 to +3 VU; Sensitivity: 80 uA DC; Int. Resist.: 16 K-ohm)	**$6.75 Net**
D1-931	"S" Meter (Calibr.: 0 to 10; Sensitivity: 1mA; Int. Resist.: 100 ohm)	**$5.50 Net**



A SUB MINIATURE RELAYS

The ideal relay for R/C model planes, cars or boats—or wherever an ultra compact, extra sensitive (10 mW) relay is required.
Size: 1-1/16" long; 17/32" wide; 13/16" high; weight: ½ oz. Contacts: SPDT—½ A @ 3V DC/12V AC or ¼ A @ 12V DC/36V AC

Cat. No.	COIL (DC ONLY)			Net
	OHM	VOLT	MA	
D1-960	100	1.5	10	**$3.45**
D1-962	1000	4.5	3.5	**3.45**
D1-963	5000	12	1.5	**3.75**

B SMALL PRECISION RELAYS

A universal relay combining compactness, great reliability, long life and good sensitivity. For printed circuit or conventional wiring.
Contacts: SPDT—3A-117V AC/DC; Size: 1-5/32" long; 1-1/32" wide; 1-1/8" high.

Cat. No.	COIL					Net
	Type	Volt	MA	Ohm	Watt	
D1-965	DC	3	25	105	0.05	**$3.75**
D1-966	DC	6	10	440	0.05	**3.75**
D1-967	DC	12	5	1760	0.05	**3.75**
D1-970	AC	6	75	26	—	**3.95**
D1-972	AC	117	6.5	7K	—	**3.95**

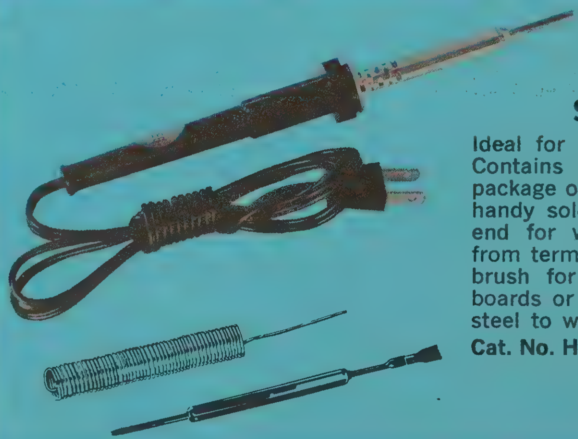
C POWER RELAY

For switching heavy loads such as motors, power supplies, etc.
Contacts: DPDT—10 A 117V AC/DC—½ HP. Size: 2-1/2" long; 1" wide; 1-3/4" high.

Cat. No.	COIL					Net
	Type	Volt	MA	Ohm	Watt	
D1-975	DC	6	500	12	3	**$3.50**
D1-976	DC	12	250	50	3	**3.50**
D1-979	AC	24	—	24	—	**3.50**
D1-980	AC	117	—	550	—	**3.50**

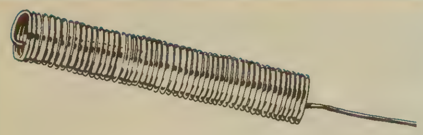
SOLDERING IRON

A quality iron of just the right size for electronic wiring and printed circuit work. Slender, replaceable tip.
Rating: 30 Watt; 115 Volt AC/DC.
Cat. No. H3-380 **$2.49 Net**



SOLDERING KIT

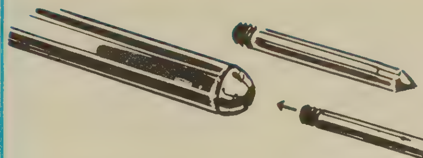
Ideal for technicians and kit builders. Contains soldering iron No. H3-380, package of 60/40 resin core solder and handy solder-aid tool. Tool has forked end for wrapping or removing wires from terminals. Other end has a metal brush for removing solder from P.C. boards or terminals. Made of stainless steel to which solder will not adhere.
Cat. No. H3-376 **$3.95 Net**



"DISPENSER PACK" SOLDER

60/40 rosin core type. Diam.: 0.050". The best for all electronic soldering.

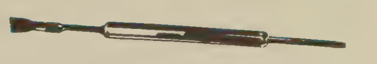
Cat. No. H3-390 80 inches **$ .49 Net**



SOLDERING IRON TIPS

Replacement tips for Calectro Iron Cat. No. H3-380. Pure copper, pre-tinned.

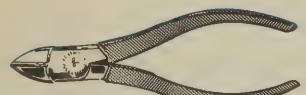
Cat. No. H3-392 Pkg. of 2 **$ .75 Net**



SOLDER AID TOOL

Forked end wraps and unwraps wire. Metal brush end for wiping solder off terminals and P.C. boards. Stainless steel to prevent solder from adhering.

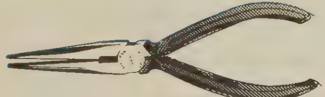
Cat. No. H3-398 **$1.00 Net**



DIAGONAL CUTTING PLIERS

Forged alloy steel. Precision ground jaws. Chrome plated. Insulated handles. Quality tools at budget prices.

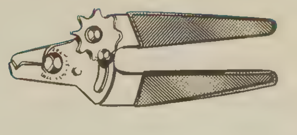
Cat. No. H3-411	5" long	**$1.99 Net**
Cat. No. H3-412	6" long	**$2.45 Net**



LONGNOSE PLIERS

Professional style and quality. With side cutter and insulated handles. Chrome plated.

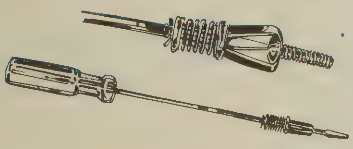
Cat. No. H3-414	5" long	**$1.99 Net**
Cat. No. H3-415	6" long	**$2.79 Net**



WIRE STRIPPER

An indispensable tool for any technician and hobbyist. Adjusts to wire size from 12 thru 26 gauge. Also cuts wire.

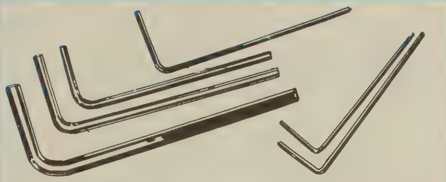
Cat. No. H3-425 **$1.38 Net**



SCREW HOLDING SCREWDRIVER

One of the handiest tools in any shop or toolbox. Holds and starts screws from No. 2 thru No. 10.

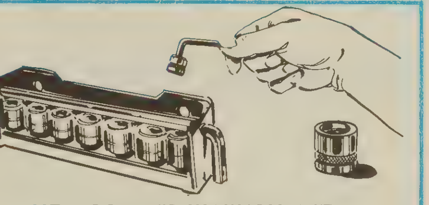
Cat. No. H3-433 **$ .79 Net**



HEX WRENCH KIT

Contains sizes needed for servicing electronic, optical and other small mechanical equipment. Sizes from 0.028 thru 3/32".

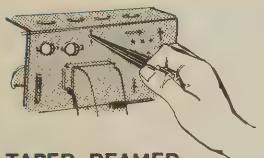
Cat. No. H3-436 Kit of 6 **$ .39 Net**



HEX SOCKET WRENCH KIT

Handy seven piece socket set with 4¼" handle. For all Hex head screws and nuts from ¼" thru 7/16" diam.

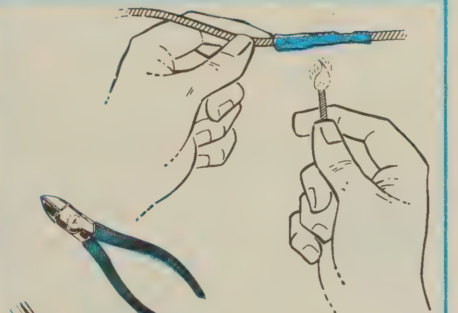
Cat. No. H3-438 **$ .85 Net**

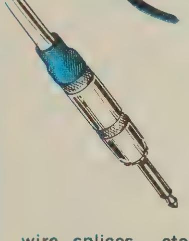


TAPER REAMER

Indispensable for work on chassis or cabinet. Start with ⅛" or larger hole and enlarge to required size. Will also remove burrs.

H3-440	Tapers to ½"	**$1.45 Net**
H3-441	Tapers to 13/16"	**$2.25 Net**

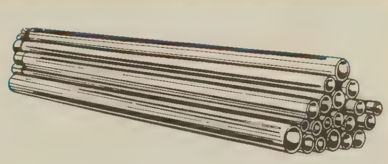




HEAT SHRINKABLE TUBING ASSORTMENT

This tubing shrinks to half its original size when heated. Use it for insulating terminals, connectors, tool handles, wire splices, etc. Use heat gun, oven, barrel of soldering iron or just a match. Assorted sizes and colors.

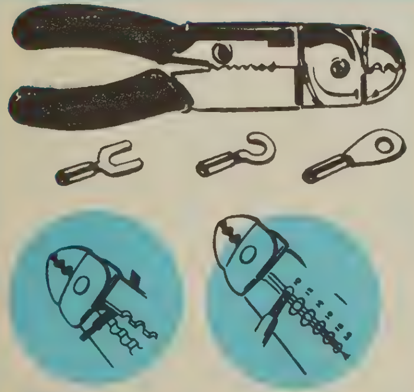
Cat. No. H3-462 **$ .98 Net**



INSULATING TUBING

A generous bargain assortment of various kinds, sizes and colors of "spaghetti." A "must" for repairs, building projects, etc.

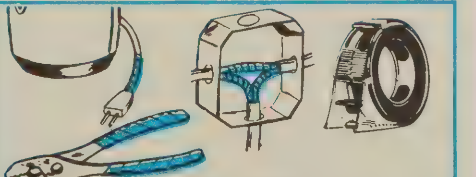
Cat. No. H3-460 **$ .59 Net**



CRIMPING TOOL AND TERMINAL ASSORTMENT

Crimps solderless terminals, and strips wires from size 10 thru 22. Clearly marked gauge. Also cuts wire. A quality tool at a price anyone can afford.

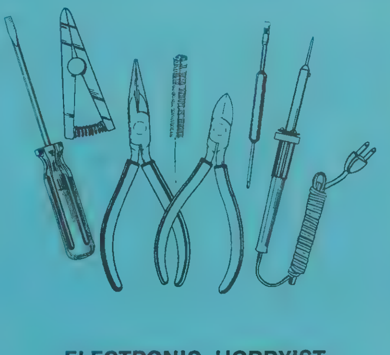
H3-445 Tool and terminals **$1.99 Net**



VINYL TAPE

Finest electrical insulating tape. UL approved. For electrical insulation, repairing garden hose, insulating tools with handy cutting dispenser.

Cat. No. H3-468 ¾" x 20 ft. **$ .65 Net**



ELECTRONIC HOBBYIST SOLDERING AND TOOL KIT

Contains all the tools and accessories for assembling kits, hobby and science projects. An ideal gift item — for lifetime enjoyment. Contains diagonal and longnose pliers, soldering iron and solder, solder aid tool, heat-sink and screwdriver.

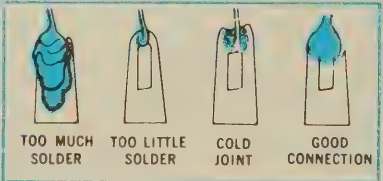
Cat. No. H3-378 **$7.95 Net**

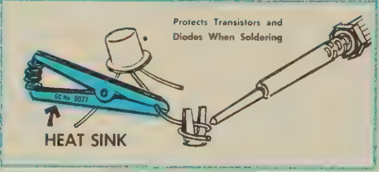
HANDY HINTS FOR ASSEMBLING ELECTRONIC HOBBY AND SCIENCE PROJECTS

The projects on the following pages have been selected to appeal to the beginner as well as to the more experienced electronic hobbyist. They include a general description of the circuit function, a circuit diagram, and a layout and wiring sketch. Many of the steps for proper construction are common to these projects, and are described and illustrated below.

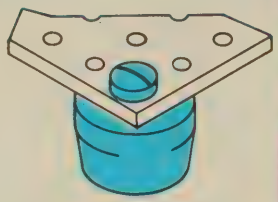
SOLDERING — IT'S EASY IF YOU FOLLOW THE RULES

There are soldering irons and solder "guns." For prototypes, experimental or science projects — nothing beats the slim small 30 to 50 Watt iron (Calectro No. H3-380). Most guns are not good tools for this purpose. Here are 8 basic soldering rules: 1 Use only rosin core solder; the type called 60/40 is best. 2 The iron tip must be clean and coated with solder. Remove any black spots or pits with a fine file or sandpaper. 3 Keep the hot tip clean by occasionally wiping it quickly with a slightly damp cotton cloth or small sponge. 4 Whenever possible, twist or wrap the wires to the terminals. They should be mechanically secure before you solder. 5 Except for coating the tip, never melt the solder by touching it to the iron. Hold the tip to the wires and terminals to be soldered until **they** are hot enough to melt the solder. Then press the solder to the joint where it will flow into and around it. 6 All parts to be soldered must be clean and shiny. Rub tarnished wire and terminals with fine steel wool or sandpaper. 7 Don't move wires or parts while the solder solidifies. If this should happen—just reheat the joint. 8 Semiconductors will be damaged by excessive heat. To avoid this while soldering: (a) Leave leads at least ⅛″ to ¼″ long; (b) Use a "heatsink" (GC Part No. 9077) or a plier; (c) solder as quickly as possible.

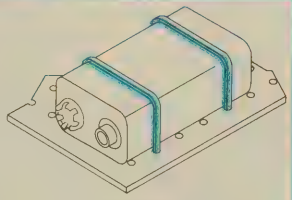


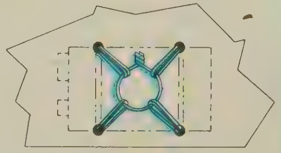


"Breadboards" should be supported by rubber feet or support brackets (Part No. J4-632). Calectro Circuit Board Kit No. J4-660 includes feet with mounting screws which should be attached to the four corners.

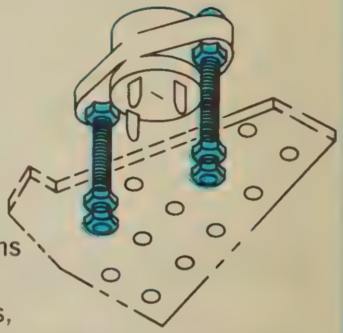


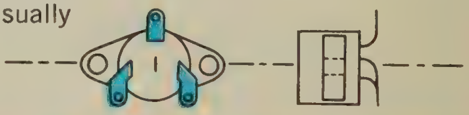
Transistor Batteries and Battery Holders can simply be mounted to Circuit Boards by using two 2½″ rubber bands. These bands are secured underneath the board by looping the four ends through a ring formed with a short piece of thin wire.





Transistor Sockets are mounted to Circuit Boards with size 2-56 screws, ½″ to ¾″ long. Use 2 screws and 6 nuts as shown in illustration. Calectro Hardware Kit No. J4-833 contains necessary screws and nuts. For professional assemblies, spacers (Calectro Kit No. J4-846) may be used. Before mounting socket, bend pins outward as shown. This makes soldering easy. If socket has four terminals, remove one as only three are usually required.



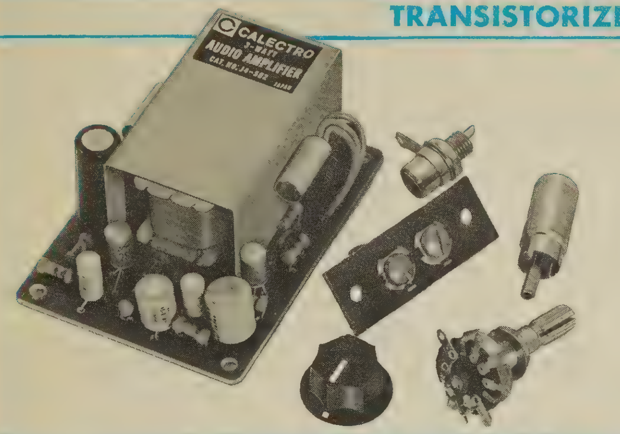


NOTICE TO EXPERIMENTERS AND HOBBYISTS We have used care and judgment in preparing the following section of the Calectro Handbook. As we have no control over the actual assembly and use of the Circuits described, we cannot assume any responsibility for their function or consequences of their application. Projects operating entirely on batteries are generally safe to build and use by anyone. Those operating off house current, or which are connected to devices using house current, should only be attempted by those having the necessary experience or under suitable supervision. GC Electronics

PROJECTS FOR HOBBYISTS, EXPERIMENTERS AND "SCIENCE FAIRS."

Have fun assembling your own electronic devices. It's a fascinating hobby — and educational, too. It's easy, especially when you start with "modules" or simple circuits. You'll find a wide range of interesting and useful products and projects on these pages.

TRANSISTORIZED AUDIO AMPLIFIER MODULES



These are mighty, but tiny, audio amplifiers, completely assembled on printed circuit boards. They are just the thing to build a phonograph (with crystal or ceramic cartridge), small P.A. or paging system — or to connect to a tuner or tape deck. Circuit is "push-pull" with 4 transistors. Input impedance is 2,000 ohm; 2 outputs: 8 and 16 ohms. They will operate on 9 Volt DC (batteries or power-supply). Frequency response is from 150 to 10kHz.

1 WATT MODEL

Cat. No. J4-590 Amplifier Only **$6.95 Net**

3 WATT MODEL

Complete kit with amplifier, all necessary controls, plugs, and connectors — plus a plastic case for an attractive housing.

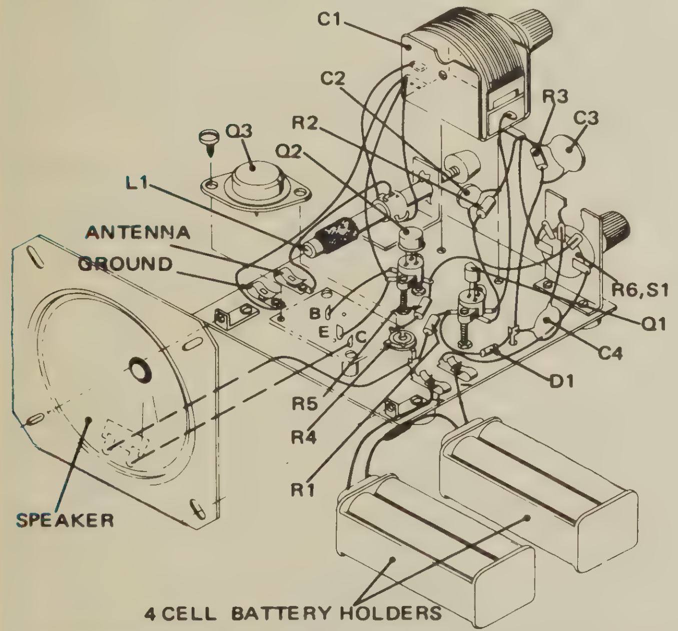
Cat. No. J4-592 Complete Kit **$11.90 Net**

PROJECT: THREE TRANSISTOR RADIO!

Here's performance you won't believe you're getting from a 3-transistor AM receiver — all because this circuit uses one of the new field-effect transistors (FET) as its RF amplifier! You actually get more stations than you'd expect from such a simple circuit, thanks to the greater selectivity resulting from the FET's extremely high input impedance. Low noise and high gain are the other advantages you get from this latest, "solid state" device. Yet you can build this powerful radio in very little time. Go to it!

OPERATION:

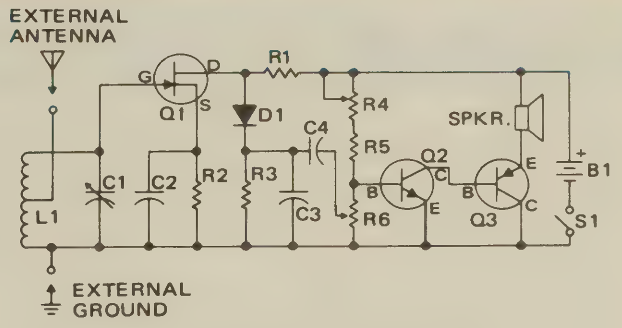
Signal is picked up on tuned circuit L1, C1 & amplified by Q1, R1 & R2 providing proper bias. Modulation is detected by D1. Signal is developed across R3. C3 filters out the RF. Audio is amplified by Q2 & Q3. R6 is the volume control & R4 is the bias adjustment. Adjustment of bias control: Adjust so that voltage drop across speaker equals 1/2 of the supply voltage.



CONSTRUCTION HINTS:

1. Mount speaker, & sockets per instructions in introductory material.
2. Bend bracket (supplied with L1) & fasten to circuit board using hardware kit #J4-833).
3. Mount volume control (R6) using mounting bracket (J4-644).
4. Mount all other parts as shown & solder in place using low wattage soldering iron.
5. Connect battery holders in series, (to provide 12 volts).
6. For best reception use CALECTRO antenna kit (Part #J4-857).

SCHEMATIC



PARTS LIST

Symbol	Description		Calectro Part No.
Q1	N Channel FET	HEP 802	
Q2	NPN Transistor		K4-506*
Q3	PNP Power Transistor (Germanium)		K4-521**
D1	Signal Diode		K4-550***
C1	365 PFD Variable Capacitor		A1-227
C2	0.01 μF Disc. Ceramic		A1-029
C3	0.02 μF Disc. Ceramic		A1-030
C4	0.1 μF Disc. Ceramic		A1-032
L1	Ferrite Antenna Coil (Variable)		D1-841
R1,R2	4,700 Ω Resistor ½ Watt 10%		(2) B1-392**
R3	1 MEG Ω Resistor ½ Watt 10%		B1-420
R4	500,000 Ω Trim Potentiometer		B1-648
R5	100,000 Ω Resistor ½ Watt 10%		B1-408
R6	50,000 Ω Potentiometer		B1-664
S1	Switch Part of R6		—
Battery Connectors			(2) F3-052**
Battery Holders, 4 Cells			(2) F3-059
Circuit Board Kit			J4-660
Fanstock Clips (Pkg.)			F2-920
Mounting Brackets (Pkg.)			J4-644
"L" Brackets (Pkg.)			J4-642
Transistor Sockets			(2) F2-984
Transistor Socket (Power)			F2-990
Knob			E2-705
Knob			E2-707
8 - 1½ V AA Cells			—
2-56 Screws & Nuts			J4-833
Hookup-Wire			L3-632

*Pkg. of 3 **Pkg. of 2 ***Pkg. of 5

PROJECT: VERY VERSATILE ELECTRIC EYE!

Now turn on anything electrical — automatically — with light! Or even turn things off, it you like. All with a sensitive photocell that reacts to light changes by opening or closing a relay — from up to 50 ft. away! Use it to trigger an alarm — to switch on lights at dusk — to activate a counter when people or objects pass. Enjoy endless hours of fun dreaming up dozens of other exciting ways to use this very versatile solid-state circuit. It's easy to build, even easier to adapt for new uses!

OPERATION:

Resistance of photocell is several hundred thousand ohms (almost like an open circuit) with no light applied. Under intense light — resistance drops to several hundred ohms.

With no light applied, the transistor is biased off and only minute leakage currents flow. With the application of light the transistor is biased on and a heavy current flows thru the relay (K1) & transistor (Q1) changing the state of the relay contacts. Use power supply if used for extended periods of time.

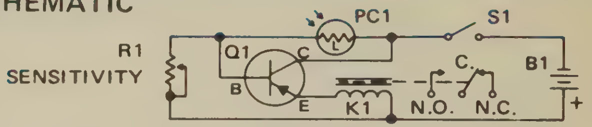
CONSTRUCTION HINTS:

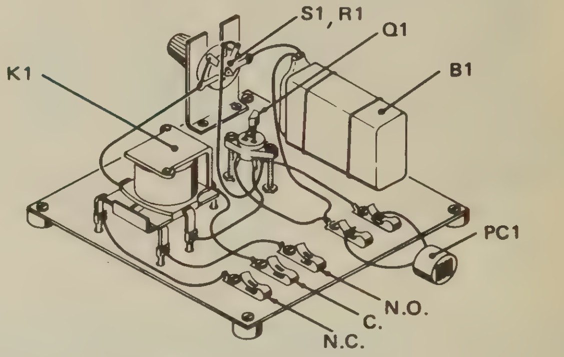
1. Use Mounting bracket (CALECTRO Part #J4-644) to support sensitivity potentiometer, R1.
2. Mount transistor socket & Battery per instructions in Introduction. Mount relay using 5 terminal clips.
3. Photocell (PC-1) can be mounted at a remote location (up to 50 feet) from circuit if desired and should be shielded with a paper tube in high ambient light.

PARTS LIST

Symbol	Description	Calectro Part No.
Q1	Transistor PNP Silicon	K4-505*
K1	Relay 6V. DC	D1-966
R1	Potentiometer 5000 Ω	B1-661
PC1	Photocell	J4-805
S1	Switch (Part of R1)	—
B1	Battery, 9V Transistor Radio	—
Circuit Board Kit		J4-660
Fanstock Clips (Pkg.)		F2-920
Mounting Bracket (Pkg.)		J4-644
Transistor Socket		F2-984

SCHEMATIC





PARTS LIST CONTINUED

Symbol	Description	Calectro Part No.
Battery Connector		F3-052
Knob		E2-705
2-56 Screws & Nuts		J4-833
Hookup-Wire		L3-632

*Pkg. of 3

PROJECT: SCREAMIN' MIMI SIREN!

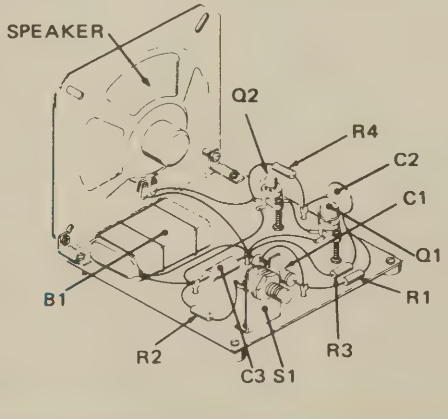
Here's one project that really wails! Its piercing, penetrating, positively paralyzing wail rises and falls just like big sirens — only maybe not quite so loud. Yet this one's good for fun, as well as for serious uses, such as home and garage burglar alarms, auto protection, etc. Nothing like it to liven up a dull party or attract attention — fast! But, it's useful in emergencies, too — especially when amplified.

OPERATION:

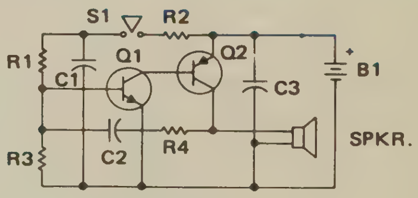
Q1 & Q2 & associated components form a multi-vibrator. C1 is charged thru R2 when S1 is closed. This increase in its charge causes frequency to rise exponentially. When S1 is opened, C1 discharges thru R1, R3 & Q1. The frequency decreases at the rate of discharge of C1.

CONSTRUCTION HINTS:

1. Mount S1 using mounting bracket (J4-644).
2. Mount transistor sockets & battery per instructions in introductory information.
3. Mount Speaker (S2-213) using 2 "L" brackets (J4-642). Remaining parts are secured to circuit board with terminal clips (supplied with J4-660).



SCHEMATIC



PARTS LIST

Symbol	Description	Calectro Part No.
Q1	NPN Transistor	K4-506 *
Q2	PNP Transistor	K4-505 *
R1,R3	68,000 Ω Resistor ½ watt 10%	(2) B1-406 **
R2	22,000 Ω Resistor ½ watt 10%	B1-400
R4	47 Ω Resistor ½ watt 10%	B1-368
C1	50 µF 12V Electrolytic	A1-108
C2	0.05 µF Disc. Ceramic	A1-031
C3	100 µF 12V Electrolytic	A1-110
S1	Push Button Switch	E2-142
B1	Battery, 9V Transistor Radio	—
Battery Connector		F3-052
Transistor Sockets		(2) F2-984
Circuit Board Kit		J4-660
Speaker 45 Ω , 4 Inch		S2-213
"L" Brackets (Pkg.)		J4-642
Mounting Brackets (Pkg.)		J4-644
2-56 Screws & Nuts		J4-833
Hookup-Wire		L3-632

*Pkg. of 3 **Pkg. of 2

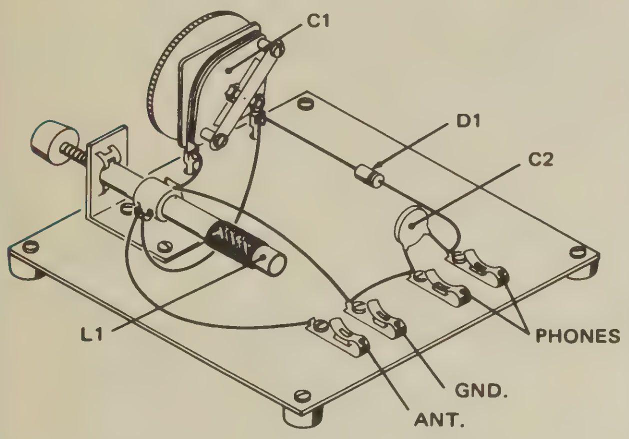
PROJECT: TWO EASY-TO-BUILD RADIOS!

Great first project for beginners! Yet both bring in nearby radio stations — and there's no better listening than to a radio you've built yourself. The crystal diode receiver, simpliest radio known, runs forever without batteries. Basically similar, the 1-transistor receiver amplifies the signal for more stations and better earphone listening. Build 'em both to learn the basics of radio building!

Crystal Diode Receiver

OPERATION:

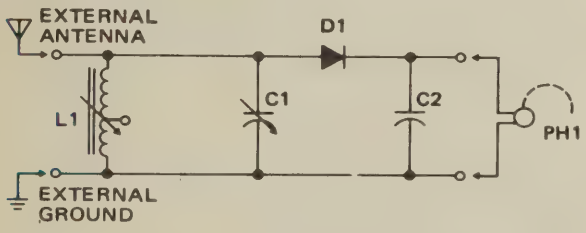
Crystal receivers typically have limited selectivity but are fine to receive nearby stations. To tune in various stations, vary both L1 & C1.



CONSTRUCTION HINTS:

1. Use 2 terminals (supplied with circuit board kit) to mount C1.
2. Bend bracket (supplied with L1) & fasten to circuit board.
3. Mount all parts shown & solder in place using low wattage (20-50 watts) soldering iron.
4. Use a rubber foot (as supplied with circuit board kit) for knob on L1 or tune with a small screwdriver.
5. For best reception use CALECTRO antenna kit (Part #J4-857).
6. If circuit is to be used with an amplifier use a 4700Ω resistor in place of headphone. (to properly load the circuit).

SCHEMATIC



PARTS LIST

Symbol	Description	Calectro Part No.
C1	365 PF Variable Cap.	A1-233
C2	0.001 μF Capacitor (Disc. Ceramic)	A1-026
L1	Ferrite Antenna Coil (Variable)	D1-841
D1	Signal Diode	K4-550*
Ph1	Earphones, 2000 Ω	J4-825
Circuit Board Kit		J4-660
Fanstock Clips (Pkg.)		F2-920
2-56 Screws & Nuts		J4-833
Hookup-Wire		L3-632

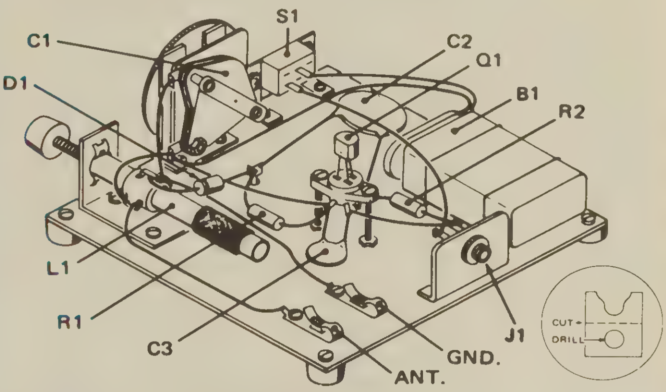
*Pkg. of 5

One Transistor Radio

OPERATION:

Plug in earphone. Turn on switch (S1) & tune in stations by varying L1 & C1.

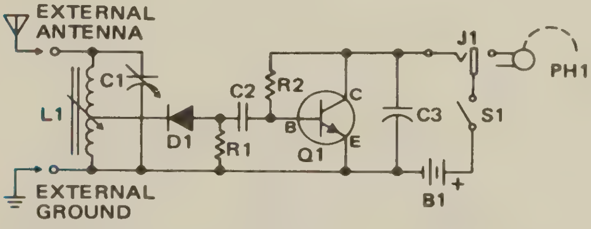
Receiver is simply an "amplified crystal diode radio." C1 & L1 tune in stations. Diode (D1) detects the audio & transistor (S1) amplifies the signal. R1 acts as a load for D1. C2 couples signal to Q1. R2 provides proper bias for Q1. C3 removes any stray R.F. from earphone signal.



CONSTRUCTION HINTS:

1. Use mounting brackets (J4-644) to mount C1 & J1. Modify bracket for J1 by cutting off & drilling hole. See detail above.
2. Mount switch (S1) using "L" brackets (J4-642).
3. Mount transistor socket & battery per instructions in introduction.
4. Use terminal clip (supplied with J4-660) at junction of D1, R1, & C2.
5. For best reception use CALECTRO antenna kit. (Part #J4-857).
6. If circuit is to be used with an amplifier use a 4700Ω resistor in place of earphone (to properly load the circuit).

SCHEMATIC



PARTS LIST

Symbol	Description	Calectro Part No.
C1	365 PF Variable Cap.	A1-233
C2	0.02 μF Cap. (Disc. Ceramic)	A1-030
C3	0.01 μF Cap. (Disc Ceramic)	A1-029
R1,R2	100,000 Ω Resistors ½ watt 10%	(2) B1-408**
L1	Ferrite Antenna Coil (Variable)	D1-841
Q1	Transistor NPN (Silicon)	K4-506*
D1	Diode	K4-550***
J1	Phone Jack, 2 Conductor	F2-837
B1	Battery, 9V Transistor Radio	—
Ph1	Earphone 2000Ω	Q4-223
S1	SPST Slide Switch	E2-110
Transistor Socket		F2-984
Mounting Brackets (Pkg.)		J4-644
Circuit Board Kit		J4-660
Battery Connector		F3-052
"L" Brackets (Pkg.)		J4-642
Fanstock Clips (Pkg.)		F2-920
2-56 Screws & Nuts		J4-833
Hookup-Wire		L3-632

*Pkg. of 3 **Pkg. of 2 ***Pkg. of 5

PROJECT: SIMPLE SOLID-STATE AMPLIFIERS!

The one transistor amplifier-speaker is perfect for improving sound and volume of a small transistor radio or to connect to the crystal or one-transistor radio The O.T.L.* amplifier can be used in pairs — for stereo. It's near hi-fidelity with an output of over 4 watts (with 12 volt supply). Use it for a phonograph or tape system, as a guitar or public address amplifier — or whenever you want a powerful — yet inexpensive, easy-to-build transistor audio amplifier.

*Output-Transformer Less

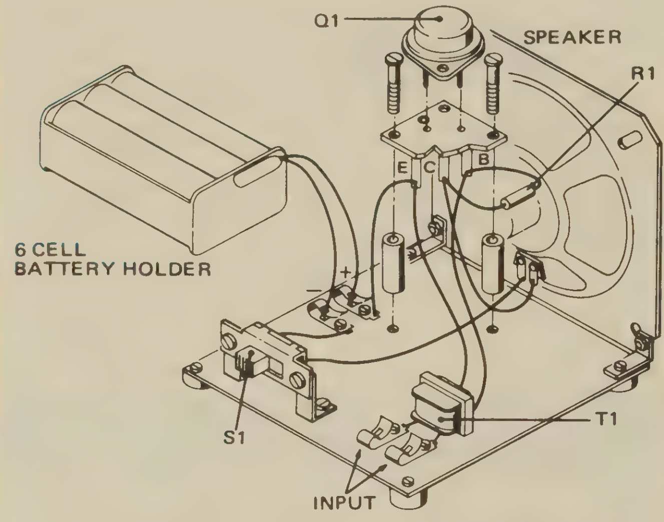
One Transistor Amplifier/Speaker

OPERATION:

Q1 is biased as a class "A" amplifier. R1 provides proper bias. T1 provides proper impedance matching.

NOTE: This circuit draws several hundred milliamperes. It is recommended that large cells or a power supply be used if circuit is on for a long period of time.

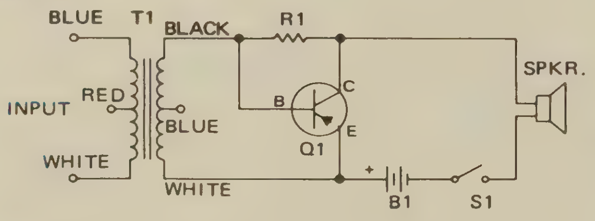
Circuit will work on 3 to 9 volts. Q1 should be heat sinked if operated on 7 to 9 volts for extended periods of time.



CONSTRUCTION HINTS:

1. Mount speaker & transistor socket per instructions in introductory material.
2. Mount transformer T1, by bending frame leads thru holes in circuit board.
3. Heat sink transistor (Q1) if circuit is to be operated at 9 volts or more for extended periods.

SCHEMATIC



PARTS LIST

Symbol	Description	Calectro Part No.
Q1	PNP Power Transistor	K4-521*
R1	470 Ω Resistor ½ Watt 10%	B1-380
T1	Output Transformer	D1-726
Speaker 8 Ω , 4 Inch		S2-212
S1	Switch SPST Slide Switch	E2-104
Circuit Board Kit		J4-660
"L" Brackets (Pkg.)		J4-642
Battery Holder		F3-060
Battery Connector		F3-052
Fanstock Clips (Pkg.)		F2-920
6 1½V AA Cells		—
2-56 Screws & Nuts		J4-833
Hookup-Wire		L3-632

*Pkg. of 2

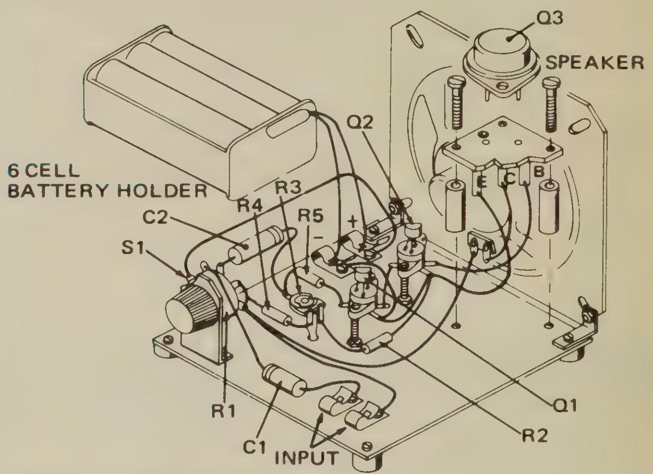
O.T.L. Amplifier/Speaker

OPERATION:

Q1,2, 3 are connected as a cascaded amplifier. R5 is a current limiting resistor. R2, 3 & 4 are biasing resistors. Input signal is applied across volume control R1 & fed to amplifier thru capacitor C2. Adjust bias resistor, R3 until 1/2 of supply voltage is measured across speaker.

NOTE: This circuit draws several hundred milliamperes. It is recommended that large cells or a power supply be used if circuit is on for a long period of time.

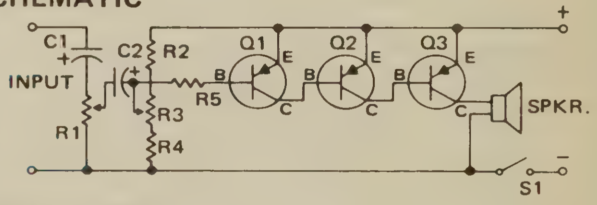
Circuit will operate on supply voltages ranging between 3 volts & 12 volts. Q3 should be heat sinked if circuit is operated for extended periods of time on 7 to 12 volts.



CONSTRUCTION HINTS:

1. Mount speaker & transistor socket per instructions in introductory material.
2. Heat sink transistor (Q3) if circuit is to be operated on 9 volts or more for extended periods.

SCHEMATIC



PARTS LIST

Symbol	Description	Calectro Part No.
Q1,Q2	PNP Silicon Transistors	(2) K4-505*
Q3	PNP Power Transistor	K4-521**
R1	10,000 Ω Potentiometer	B1-662
R2	10,000 Ω Resistor ½ Watt 10%	B1-396
R3	100,000 Ω Trim Put.	B1-646
R4	47,000 Ω Resistor ½ Watt 10%	B1-404
R5	4,700 Ω Resistor ½ Watt 10%	B1-392
C1,C2	5 μF 12 Volt Electrolytic	A1-103
Speaker 8 Ω , 4 Inch		S2-212
S1	Switch (Part of R1)	—
Transistor Sockets		(2) F2-984**
Transistor Socket (Power)		F2-990
6, 1½V AA Cells		—
Battery Holder 6 Cell		F3-060
Battery Connector		F3-052
Fanstock Clips (Pkg.)		F2-920
Mounting Brackets (Pkg.)		J4-644
"L" Brackets (Pkg.)		J4-642
Circuit Board Kit		J4-660
Knob		E2-705
2-56 Screws & Nuts		J4-833
Hookup-Wire		L3-632

*Pkg. of 3 **Pkg. of 2

PROJECT: GENERAL PURPOSE TIMING SWITCH!

Your own imagination's the only limitation on the number of ways you can use this accurate timing circuit! It lets you time the operation of anything electrical at any interval from 10 to 100 seconds. The variable resistor (potentiometer) lets you dial the exact timing you want. If photography's your hobby, there are lots of ways to use this timer in your darkroom. Or, use it to switch off a light a full minute or more after you pull into the garage — giving yourself time to get out and into the house before it shuts off!

OPERATION:

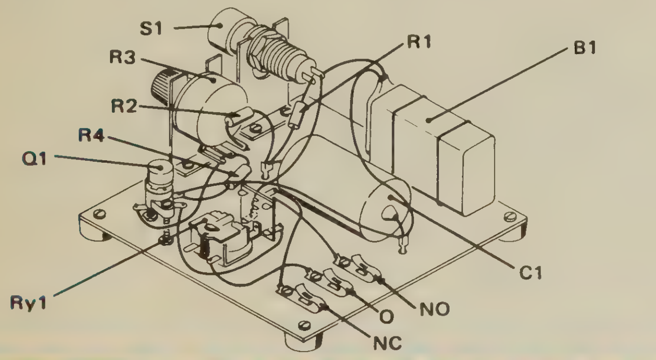
When S1 is closed, C1 is charged up to the supply voltage. Current then flows thru emitter-base of Q1 & R1 & thru R3 & R2 discharging C1. This biases Q1 "on" & the current flowing thru Q1 & RY1 closes contacts on relay. They stay in this condition until C1 is discharged below saturation level of Q1. The rate of discharge of C1 & the resultant time is determined by R1.

NOTE: No on-off switch is required as the leakage of the transistor under "off" condition is in the order of 1 microampere.

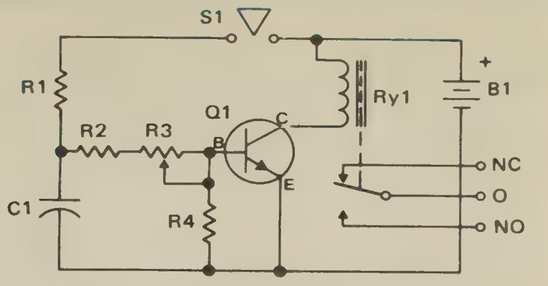
CONSTRUCTION HINTS:

1. Mount transistor socket, battery, & relay per instructions in introductory material.
2. Mount S1 & R2 using mounting brackets (J4-644).

NOTE: Range can be changed by changing value of timing capacitor, C1.



SCHEMATIC



PARTS LIST

Symbol	Description	Calectro Part No.
Q1	NPN Transistor Silicon	K4-506 •
R1	10 Ω Resistor ½ Watt 10%	B1-360
R3	50,000 Ω Potentiometer	B1-664
R2	1,000 Ω Resistor ½ Watt 10%	B1-384
R4	270,000 Ω Resistor ½ Watt 10%	B1-413
C1	1000 μF 25 Volt Electroytic	A1-133
S1	Push Button, Normally open Switch	E2-142
RY1	1000 Ω Sensitive Relay	D1-962
B1	Battery, 9V Transistor Radio	—
Circuit Board Kit		J4-660
Fanstock Clips (Pkg.)		F2-920
Mounting Brackets (Pkg.)		J4-644
Knob		E2-715
Battery Connector		F3-052
Transistor Socket		F2-984
2-56 Screws & Nuts		J4-833
Hookup-Wire		L3-632

•Pkg. of 3

PROJECT: TELEGRAPH CODE PRACTICE OSCILLATOR!

You can master Morse code — starting now — with this efficient, direct-coupled circuit! It's the perfect first project if you're a Scout or planning to make Ham Radio your hobby. And its even more than just a Code Practice Oscillator (CPO), since you can use it to make a noisy burglar alarm for your home, car, or boat. Has both pitch and volume controls, so you can vary frequency and level to suit yourself. Building this simple circuit can be the beginning of a lifetime hobby. Better begin. Build it!

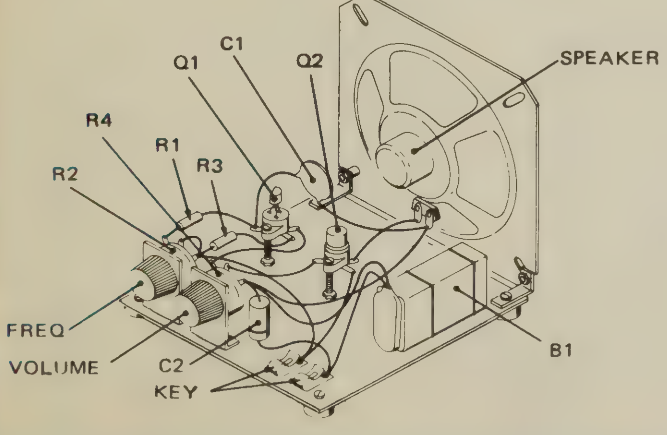
OPERATION:

Q1 is a unijunction transistor connected as a relaxation oscillator. Capacitor, C1, charges up thru R1 & R2 when the firing potential of Q1 is reached — C1 is discharged rapidly thru R4 & the base-emitter junction of Q1. R2 varies the rate of charge of C1 & thus the frequency. Q2 is a direct coupled emitter-follower. The potential built up across R4 when C1 is discharged, biases Q2 "on" & a 'pop' is heard in the speaker. R4 controls the volume.

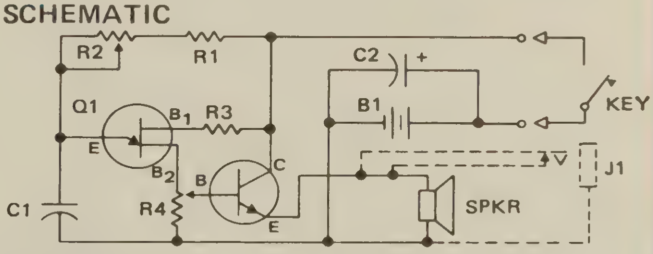
CONSTRUCTION HINTS:

1. Refer to instructions in introductory material on mounting battery & transistor sockets.
2. Mount potentiometers (R2, R4) using mounting brackets (J4-644).
3. Mount speaker (S2-212) using 2 "L" brackets (J4-642).

OPTIONAL:
Add J1 between Q2 & speaker for headphone operation, (J1 — Phone Jack — Part #F2-842).



SCHEMATIC



PARTS LIST

Symbol	Description		Calectro Part No.
Q1	Unijunction Transistor	HEP 310	
Q2	NPN Transistor, (Silicon)		K4-506 •
C1	0.1 μFD Capacitor, Disc.		A1-032
C2	100 μF 12V Electrolytic		A1-110
R1	6800 Ω Potentiometer		B1-394
R2	50,000 Ω Potentiometer		B1-664
R3	470 Ω Resistor ½ Watt 10%		B1-380
R4	1000 Ω Potentiometer		B1-660
B1	Battery, 9V Transistor Radio		—
Speaker 8 Ω 4 inch			S2-212
Telegraph Key			J4-820
Circuit Board Kit			J4-660
Battery Connector			F3-052
Transistor Sockets			(2) F2-984
Fanstock Clips (Pkg.)			F2-920
"L" Brackets (Pkg.)			J4-642
Mounting Brackets (Pkg.)			J4-644
Knobs			(2) E2-705
2-56 Screws & Nuts			J4-833
Hookup-Wire			L3-632

•Pkg. of 3

PROJECT: AMAZING WIRELESS MIKES!

Both of these actually put you on the air — without restricting wires — over any AM or FM radio! Picture you producing your own spectaculars in sound, free to roam the room while you broadcast.

The FM mike's so powerful you can actually use it at up to a block or two from your receiver! And both these wireless mikes are tunable, so you can set 'em for any quiet spot on your radio's dial.

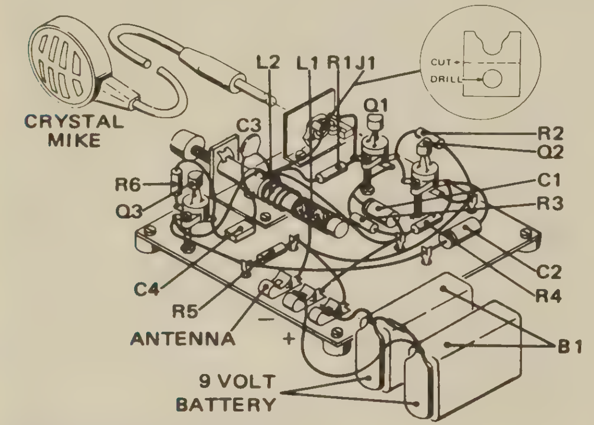
AM Wireless Transmitter

OPERATION:

Q1 & Q2 & associated components are connected as an audio amplifier. The Field Effect Transistor (Q1) provides proper impedance matching for crystal microphone. Q2 is an emitter follower. Q3 is connected as a Hartley oscillator & is modulated by Q1 & Q2.

TO OPERATE MICROPHONE:

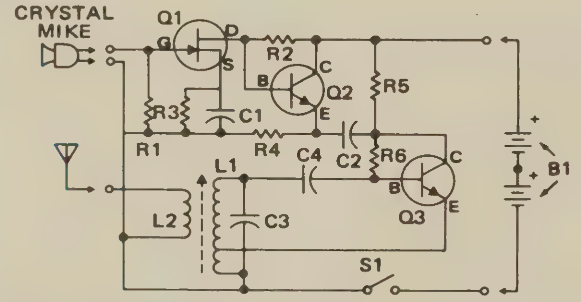
Tune to a quiet spot on AM Radio. Adjust L1 until mike is picked up on the radio.



CONSTRUCTION HINTS:

1. Mount transistor sockets per instructions in introductory information. Mount all other parts per schematic and pictorial drawing.
2. Modify mounting bracket and drill 1/4" hole to mount J1 (see detail).
3. L2 is constructed by winding 4 turns of hook-up wire on top of L1.
4. Add optional ON-OFF switch (E2-110) if desired.
5. Connect 9 volt batteries in series for 18 volts output.

SCHEMATIC



PARTS LIST

Symbol	Description	Calectro Part No.
Q1	Field Effect Transistor HEP 802	
Q2,Q3	NPN Silicon Transistor	(2) K4-507*
R1	1,000,000 Ω Resistor ½ Watt 10%	B1-420
R2,R4	22,000 Ω Resistor ½ Watt 10%	B1-400
R3	4,700 Ω Resistor ½ Watt 10%	B1-392
R5	47,000 Ω Resistor ½ Watt 10%	B1-404
R6	470,000 Ω Resistor ½ Watt 10%	B1-416
C1,C2	10 μFD 12 Volt Electrolytic	(2) A1-104
C3	220 PF Disc. Ceramic	A1-060
C4	10 PF MICA	A1-001
L1	Ferrite Antenna Coil (Variable)	D1-841
L2	(See Text)	—
B1	2 Batteries, 9V Transistor Radio	—
J1	Phone Jack	F2-837
Crystal Mike		Q4-189
Fanstock Clips (Pkg.)		F2-920
Circuit Board Kit		J4-660
Battery Connectors		(2) F3-052*
Transistor Sockets		(3) F2-984*
OPTIONAL:		
Switch SPST Slide		E2-110
2-56 Screws & Nuts		J4-833
Hookup-Wire		L3-632

*Pkg. of 2

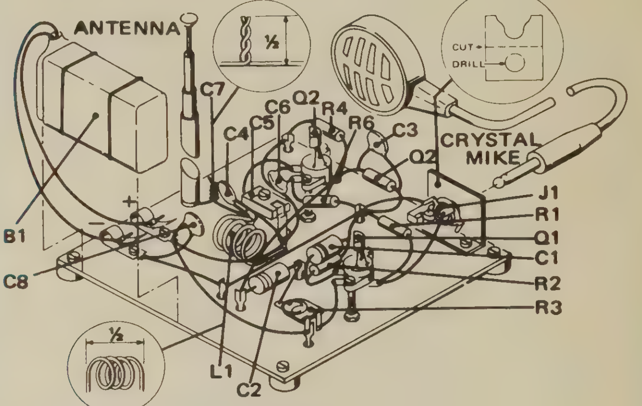
FM Wireless Transmitter

OPERATION:

Field Effect Transistor (Q1) amplifies the signal from the crystal mike. R3 is connected as a modulation control — normal setting is halfway. By adjusting the trim pot. toward drain connection on FET, maximum sensitivity is obtained. Q2 & associated components form an oscillator tunable from 88- to 108 MHz.

TO OPERATE MICROPHONE:

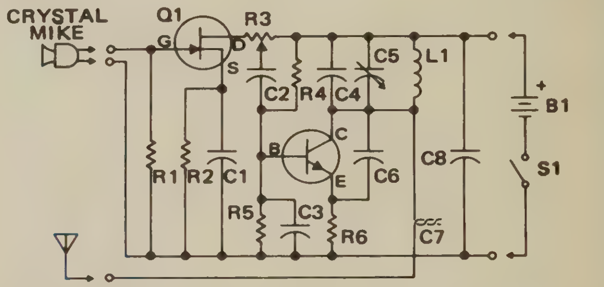
Tune FM Receiver to a quiet spot. Then adjust C5 until signal is picked up on the radio.



CONSTRUCTION HINTS:

1. Mount transistor sockets per instructions in introductory information.
2. Modify mounting bracket & drill 1/4" hole to mount J1. L1: Wrap 4 turns of wire around pencil & space 1/2". C7: Twist 2 lengths of insulated wire. See details above.
3. Mount all parts per schematic & pictorial drawing.
4. Add optional on off switch (E2-110) if desired.

SCHEMATIC



PARTS LIST

Symbol	Description	Calectro Part No.
Q1	Transistor, FET, N Channel HEP 802	
Q2	NPN Silicon Transistor HEP 55	
R1	1 MEG Ω Resistor ½ Watt 10%	B1-420
R2,R5	4,700 Ω Resistor ½ Watt 10%	(2) B1-392*
R3	10,000 2 Trim Pot	B1-644
R4	10,000 Ω Resistor ½ Watt 10%	B1-396
R6	330 Ω Resistor ½ Watt 10%	B1-378
C1,C2	10 μFD 12V Electrolytic	(2) A1-104
C3	0.01 μFD Disc. Ceramic Capacitor	A1-064
C4	10 μFD MICA Capacitor	A1-001
C5	1.5-7.5 PF Variable Capacitor	A1-245
C6	10 PFD MCA Capacitor	A1-001
C7	Gimmick CAF. (See Text)	—
C8	0.01 μFD Capacitor Disc.	A1-029
L1	4 Turns #16 or #18 Wire (See Text)	—
B1	Battery, 9V Transistor Radio	—
J1	Phone Jack	F2-837
Antenna		J4-850
Transistor Sockets		(2) F2-984*
Circuit Board Kit		J4-660
Fanstock Clips (Pkg.)		F2-920
Battery Connector		F3-052
Crystal Mike		Q4-189
2-56 Screws & Nuts		J4-833
Hookup-Wire		L3-632

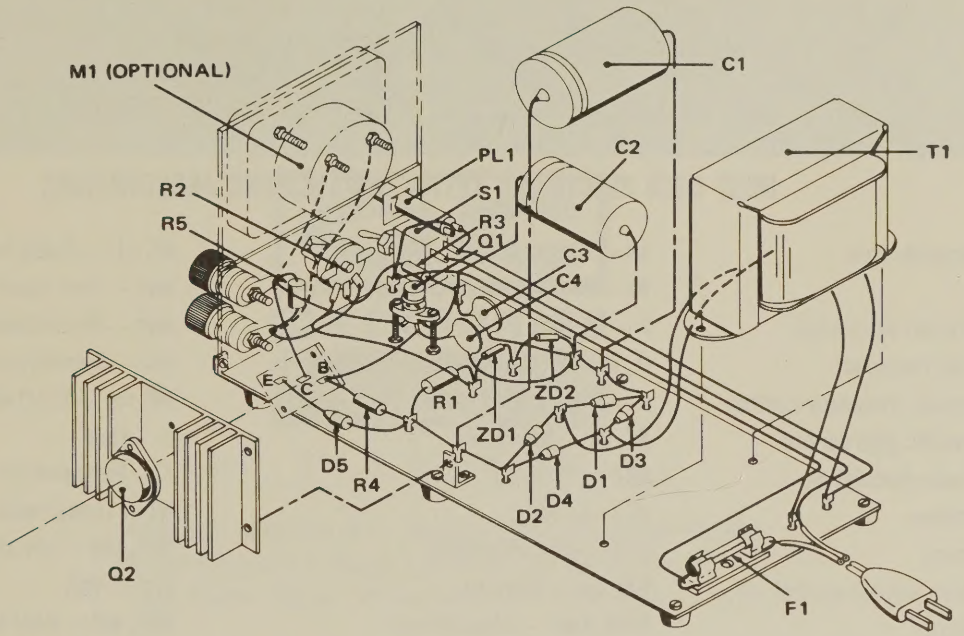
*Pkg. of 2

PROJECT: MONEY SAVER POWER SUPPLY!

Build this circuit and you'll no longer need batteries to power any transistor radio, tape recorder or other device that needs 0-20 volts and up to 1 amp DC! It's also a reliable, hum-free plug-in power source for most of the projects in this book and it can save you its own cost in practically no time at all. Because you may never again have to dig down for the price of batteries to enjoy your hobby! This power supply features good filtering and regulation over its entire range. One of the more challenging projects in this book, but delivers results well worth the effort! For a real professional job - this project may be built in a suitable metal box.

OPERATION:

Input line voltage is stepped down & rectified & filtered by T1, D1 thru 4 & C1 respectively. The voltage across C1 is 36 volts. A portion of this is dropped across R1 leaving 20 volts across the combination of ZD1 & ZD2. Q1 is connected on a regulating amplifier & Q2 is connected as a series pass transistor.



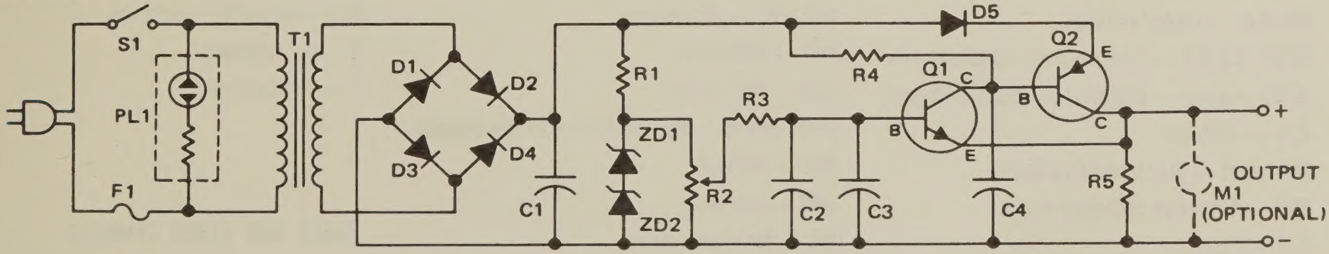
CONSTRUCTION HINTS:

1. Mount transistor sockets per instructions in introduction.
2. Cut circuit board (J4-660) in half* to form front panel & secure to circuit board (J4-616) using 2 "L" brackets (J4-642). Drill appropriately sized holes in front panel & mount PL1, SW1, R2, & binding posts.
3. Mount transformer (T1) & fuse holder (F1) to board using 2-56 hardware.
4. Mount heat sink to circuit board using 2 "L" brackets.
5. Secure all other parts to board using terminals supplied with circuit boards.

*NOTE: As an optional feature, voltmeter (D1-920) can be mounted on upper half of circuit board (J4-660).

IMPORTANT! This circuit uses 110V 60 cycle current. Use extreme caution. It is recommended that all connections on the primary side of T1 be fully insulated.

SCHEMATIC



PARTS LIST

Symbol	Description	Calectro Part No.
Q1	NPN Transistor	K4-506 *
Q2	PNP Transistor, Power HEP 232	—
D1 - D5	Silicon Diodes 50V PIV 1 amp	(5) K4-555 **
ZD1,ZD2	Zener Diodes, 10V (2) HEP 101	—
F1	Fuse Holder	E2-497
T1	Filament Transformer, 24V, 2 amp	D1-753
C1	2000 μF 50 Volt Electrolytic	A1-158
C2	1000 μF 25 Volt Electrolytic	A1-133
C3,C4	0.1 μF Disc. Ceramic	(2) A1-032
R1	470 Ω Resistor 1 Watt 10%	B1-380
R2	5000 Ω Potentiometer	B1-661
R3	100 Ω Resistor ½ Watt 10%	B1-372
R4	100 Ω Resistor ½ Watt 10%	B1-372
R5	1000 Ω Resistor 1 Watt 10%	B1-471
PLI	Pilot Light Assembly	E2-420
S1	Switch - Toggle	E2-130

PARTS LIST CONTINUED

Symbol	Description	Calectro Part No.
	Line Cord	L3-717
	Circuit Board Kit	J4-660
	Circuit Board	J4-616
	Binding Posts (Pkg. of 2)	F2-926
	Transistor Socket	F2-984
	Transistor Socket (Power)	F2-990
	Knob	E2-705
	"L" Mounting Bracket (Pkg.)	J4-642
	Heat Sink; Cordover HST-7 or anything similar	—
	Fuse ½ Amp; Littlefuse 3 AG ½ Amp	—
	2-56 Screws & Nuts	J4-833
	Hookup-Wire	L3-632
	OPTIONAL:	
M1	Voltmeter 0-15 Volts	D1-920

*Pkg. of 3 **Pkg. of 2

METRIC PREFIXES, VALUES AND POWERS OF TEN

Symbol	Prefix	Multiple
T	tera	10^{12} =1,000,000,000,000
G	giga	10^{9} =1,000,000,000
M	mega	10^{6} =1,000,000
k	kilo	10^{3} =1,000
h	hecto	10^{2} =100
d	deci	10^{-1} =0.1
c	centi	10^{-2} =0.01
m	milli	10^{-3} =0.001
μ	micro	10^{-6} =0.000001
n	nano	10^{-9} =0.000000001
p	pico	10^{-12} =0.000000000001

MOST USED ELECTRONIC LETTER SYMBOLS AND ABBREVIATIONS

A — Ammeter; ampere; area
a — Ampere
AC, a,c., ac — Alternating current
AF, a.f., af — Audio frequency
AFC, afc — Automatic frequency control
AGC, agc — Automatic gain control
AM, am — Amplitude modulation
Amp, amp. — Ampere
Ant., ant. — Antenna
AVC, a.v.c — Autom. volume control
BC, bc — Broadcast
BFO, bfo — Beat-frequency oscillator
C — Capacitance; capacitor
°C — Degrees; centigrade
cm — Centimeter
cps — Cycles per second (hertz)
CW, cw — Continuous wave
db — Decibels
DC, d.c. — Direct current
DPDT, d.p.d.t. — Double-pole, double-throw
DPST, d.p.s.t. — Double-pole, single-throw
E, e — Voltage
EMF, emf — Electromotive force
ERP — Effective radiated power
F, f — Farad
f — Frequency
°F — Degrees, Fahrenheit
FM, f.m. — Frequency modulation
G — Conductance
GMT — Greenwich Mean Time
gnd — Ground
H, h — Henry
HF, h.f.,hf — High frequency
hp — Horsepower
hy — Henry
Hz — Hertz (cycles per second)
I — Current
IF, i.f. — Intermediate frequency
k — Dielectric constant
KC, kc — Kilocycle
kHz — Kilohertz
kV — Kilovolt
kVA — Kilovolt ampere
KW, kw — Kilowatt
KWH, kwh — Kilowatt hour
L — Inductance; inductor
m — Meter
mA — Milliampere
MC, Mc, mc — Megacycle
mf, mfd — Microfarad
MHz — Megahertz
meg — Megohm
mf, mfd — Microfarad
mH — Millihenry
mm — Millimeter
mmf, mmfd — Micromicrofarad (picofarad)
mV — Millivolt
mW — Milliwatt
NC — No connection
OD — Outside diameter
P — Power
pF — Picofarad
p-p — Peak-to-peak
Q — Merit of a coil or capacitor; quantity of electricity
R — Resistance; resistor
RC, R-C — Product of resistance and capacitance; resistor-capacitor
RF, r.f. — Radio frequency
rms — Root mean square
rpm — Revolutions per minute
sec — Second; secondary
SW, sw — Short wave
t — Time
T — Temperature
trf — Tuned radio frequency
UHF, uhf — Ultrahigh frequencies
V, v — Volt
VHF, vhf — Very high frequencies
VOM — Volt-ohm-milliammeter
VTVM — Vacuum-tube voltmeter
VU — Volume unit
W — Watt; work
wh, whr — Watt-hour
X — Reactance
XC — Capacitance reactance
XL — Inductive reactance
Y — Admittance
Z — Impedance

GREEK AND OTHER SYMBOLS

μA — Microampere
μF — Microfarad
μH — Microhenry
μV — Microvolt
μμF — Micromicrofarads (picofarad)
∼ — Hertz
Ω — ohm
KΩ — kilo ohm
Meg Ω — megohm

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